COMPARATIVE STUDY BETWEEN TRANSURETHRAL RESECTION (TURP) AND TRANSURETHRAL INCISION (TUIP) OF THE PROSTATE FOR SMALL SIZE BENIGN PROSTATIC HYPERPLASIA

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CERTIFICATE

This is to certify that the dissertation titled **COMPARATIVE STUDY BETWEEN TRANSURETHRAL RESECTION (TURP) AND TRANSURETHRAL INCISION (TUIP) OF THE PROSTATE FOR SMALL SIZE BENIGN PROSTATIC HYPERPLASIA"** submitted by **Dr.R.NAGARAJ** to the Faculty of Urology, The Tamilnadu Dr.MGR Medical University, Chennai in partial fulfillment of the requirement for the award of M.Ch Degree in Urology branch is a bonafide work carried out by him under direct supervision and guidance.

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ABBREVIATION

BPH	-	Benign Prostatic Hyperplasia
BPE	-	Benign Prostatic Enlargement
BOO	-	Baladder Outlet Obstruction
LUTS	-	Lower Urinary Tract Symptoms
IPSS	-	International Prostatic Symptom Score
QOL	-	Quality of Life
PFR / Qmax	-	Peak Flow Rate / Maximum Urinary Flow
PVR	-	Post Void Residue
TURP	-	Transurethral resection of the Prostate
TUIP	-	Transurethral Incision of the Prostate
AUA	-	American Urological Association

CONTENTS

COMPARATIVE STUDY BETWEEN TRANSURETHRAL RESECTION (TURP) AND TRANSURETHRAL INCISION (TUIP) OF THE PROSTATE FOR SMALL SIZE BENIGN PROSTATIC HYPERPLASIA

ABSTRACT

AIM

To evaluate the efficacy of TUIP as a treatment modality for small size obstructive BPH and to compare its outcome with that of TURP

OBJECTIVES

To optimize treatment modality of small size obstructive BPH with minimally invasive procedure

MATERIALS AND METHODS:

1. Study group :

Patients who were admitted with bothersome lower urinary tract symptoms (LUTS) due to benign prostatic hyperplasia at 1. Kilpauk Medical College Hospital and 2. Government RoyapettahHospital between 2010 - 2011were included in the study group.

2. Study design : Prospective Randomised Clinical study

3. Materials :

60 patients were included in our study who fulfilled our selection criteria. They were randomly selected into two groups (Group 1- TUIP, Group 2 – TURP). The two groups were analysed for statistical equality. Mean of age – 67.54 years and 65.07

years, gland size – 28.58 and 29.44 grams, IPSS – 25.73 and 25.41, QOL – 4.23 and 4.15 Peak uroflowmetry – 6.23ml and 6.36ml, post void residual urine – 128 and 114 ml in TUIP and TURP respectively which were statistically not significant.

Preoperative variables (symptom scores, PVR, uroflowmetry parameters) comparable in between TURP and TUIP group

Operative variables (operating time, amount of irrigation fluid and blood transfusion required) were observed and recorded. Postoperative catheterization period and hospital stay (in days) noted. Post operative variables (symptom scores, PVR, uroflowmetry parameters) were compared.

Preoperative, intraoperative and postoperative variables were collected and analysed. In study group 1(TUIP) 4 patients were lost to follow up and in group 2(TURP) 3 patients were lost to follow up.

RESULT:

In our study, outcome assessed by comparing difference (improvement) in variables which shows TUIP is equally efficacious to TURP in smll size (less than 35 grams) BPH. Intra operative variable showed significant reduction in operative time and irrigant usage resulting decreased risk for stricture rate, TUR syndrome and electrolyte disturbances. In TUIP, immediate postoperative discomfort due to traction application was not present. Transfusion need was not present with TUIP, whereas transfusion was needed with TURP .An objection to TUIP is that incidental prostatic cancer will not be diagnosed due to non availability of tissue for biopsy. This could be dealt with by a needle biopsy of the prostateHowever, reoperation risk is more with

TUIP. This lead to our concern over long term outcome of TUIP surgery. Hence the need for long term follow-up. TUIP can be a better choice in selected group of patients like those who are not fit for prolonged anaesthsia due to age or comorbid conditions.

CONCLUSION:

TUIP is an effective method of relieving urinary outflow obstruction caused by Benign Prostatic Hyperplasia when prostate size is 35g or less.

TUIP is a less invasive, more cost effective treatment that has fewer associated side effects than TURP.

In selected group of patients, TUIP is an effective alternative to TURP

INTRODUCTION

Benign prostatic hyperplasia (BPH) is the most common condition affecting men those are 50 years of age and above. A multicentre study performed in different countries in Asia showed that the age-specific percentages of men with moderate-to-severe symptoms were higher than those in America [2]. The prevalence increases from 18% for men in their 40 years to 56% for those in their 70 years of age.

BPH is a hyperplastic process of the glandular epithelial elements andfibromuscular stromal elements of the prostate. BPH can impact onquality of life. BPH manifests clinically with lower urinary tract symptoms (LUTS) and may be associated with sexual dysfunction. 50 to 70% of men with histological features of BPH also have a prostate volume of more than 25gms (BPE), and up to 28% have moderate to severe LUTS [3, 4]. The clinical impact is because of bothersome LUTS. BOO(bladder outlet obstruction) was detected in about52% of the asymptomatic and60% of the symptomatic men with BPH [6,7,15].Although it is not lifethreatening,its clinical manifestation as lower urinary tract symptoms (LUTS) reduces the patient's quality of life. Troublesome LUTS can occur in up to 30% of men older than 65 years [5].

Several mechanisms seem to be implicated in the pathophysiology of BPH. These represent age-relatedhormonal alterations,tissue modifications, and metabolic syndrome as well as inflammation[8].

Although androgens do not take part in causation of BPH, the development of BPH needs the androgens' presence. Moreover, several studies support the association betweenhypertension, obesity, non insulindependent diabetes mellitusand low high-density lipoprotein cholesterol and the development of BPH. Finally, recent increasing evidence seems to support the idea that BPH consists of an inflammatory-based disorder.

In 2010, the American Urological Association launched an initiative to identify national research priorities in urology, known as the AUA Foundation National Urology Research Agenda (NURA), this document defines the top issues facing urology, and BPH is identified as an area for scientific opportunity[1].

Transurethral resection of the prostate is the second most common surgery[9] that a male of age greater than 50 years undergoes, second only to cataract surgery. TURP has withstood the test of times in being the gold standard treatment in the management of BPH [2]. The advent of use of LASERs in endourology has put the exclusivity of TURP in the management of BPH in jeopardy. Holmium laser (HoLEP) is upcoming as the standard procedure[13,14] though it is still questioned by many urologists. However in developing countries the prohibitive cost of these lasers make their widespread public use difficult. TURP still remains the widely used technique for the management of BPH[10,11,12].

TURP, with the advent of newer technologies in diathermy and visual scopes, has turned from a complication fraught procedure to a relatively safe one. But still the risks of TURP syndrome and electrolyte disturbances do exist especially in cardiac risk patients accentuated by the use of glycine as anirrigant fluid. The advent of bipolar diathermy has made the use of normal saline as a safe irrigant fluid[107].

The relevance of resection procedures in the treatment of small gland bladder outlet obstruction has been questioned. Several authors have propagated the use of transurethral incision of bladder neck and prostate in the case of small prostate BOO[24,25,26].

The fact that TUIP is a less morbid procedure than TURP, shifts the balance in its favor and has revived this ancient procedure popularized by Orandi. It has been shown to have an important role in the management of younger patients, especially if the prostate is smaller than 30g[27,28]. The efficacy is comparable in such patients with TURP, and the results are maintained in the long term. The technique is simple with low morbidity and cost effective. The role of this cost effective surgery in small gland BOO needs evaluation especially with reference to developing countries.

As per AUA guidelines, Option: TUIP is an appropriate and effective treatment alternative in men with moderate to severe LUTS and/or who are significantly bothered by these symptoms when prostate

size is less than 30 grams. The choice of approach should be based on the patient's individual presentation including anatomy, the surgeon's experience and discussion of the potential benefits and risks for complications[1].

For BPH with small gland size, treatment options are watchful waiting, medical management and surgical options. In our population, periodic followup and cost consensus have made non invasive options less feasible. Hence a low cost, less morbid procedure for small sized glands with the available facilities would be a better choice.

We opted for transurethral incision of prostate, which does not need any special instruments other than those used for TURP. Many Randomized Control Trial`s have already compared efficacy of these two procedures in gland size of 30-50 grams[27,28,29,30,31].Wehave planned to evaluate the efficacy of TUIPas a treatment modality for small size(35 grams) obstructive BPH and to compare its outcome with that of TURP in our institution.

The presence of cultural, social, literacy barriers restricted the collection of details regarding sexual function, retrograde ejaculation . Hence we evaluated IPSS, QOL, PFR, PVR as variables to assess outcome.

AIM

To evaluate the efficacy of TUIP as a treatment modality for small size obstructive BPH and to compare its outcome with that of TURP

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REVIEW OF LITERATURE

The prostate, seminal vesicles, ampullary glands, and bulbourethral glands are considered as sex accessory tissues include and are believed to play a major but unknown role in the reproductive process.[41,42]

The prostate development from the urogenital sinus during the third month of intra uterine growth and development is directed primarily by DHT[41,42,43]. Five epithelial buds form in a paired manner on the dorsal aspect of the urogenital sinus on each side of the verumontanum, and they then invade the mesenchyme to form the prostate. The top pairs of buds form the inner zone of the prostate of mesodermal origin; the lower buds form the outer zone of the prostate of endodermal origin. This is of potential importance since the inner zone gives rise to benign prostatic hyperplasia (BPH) tissue, whereas the outer zone remains the primary origin of cancer. These two zones of the prostate develop as concentric circles around the urethra. The center portion of the prostate contains the mucosal and submucosal gland and the ejaculatory ducts as well as the small remnants of the müllerian duct—the utriculusprostaticus, which forms the small prostatic utricle. By fourth month of fetal life, the prostate forms acini and collecting ducts by arborization into the urethra; the growth occurs primarily on the tips, as the ducts extend and branch during development. This concept of dynamic growth processes occur along a budding and branching system was developed from studies on the

mouse and rat prostate[43] (Sugimura et al, 1986 ; Banerjee et al, 1993a, 1993b; Cunha, 1994).

The prostate measures4 cm in width,3 cm in length, and 2 cm in depth; and is traversed by the prostatic urethra. The prostate is with a narrowed apex facing inferiorly and a broad base that is contiguous with bladder base[48,51]. It is enclosed by a capsule composed of collagen, elastin, and abundant smooth muscle. an average thicknessof this capsule is 0.5 mm. There is a plane betweenthe rectum and Denonvilliers' fascia, filled by loose areolar tissue. The capsule blends with the visceral continuation of endopelvic fasciaat the anterior and anterolateral surfaces of the prostate. Puboprostatic ligaments extend anteriorly to fix the prostate to the pubic bonetoward the apex[45, 46].

The apex of the prostate is blended with the striated urethral sphincter[52,53]. Histologically, normal prostatic glands is found to extend into the striated muscle with no intervening “capsule” orfibromuscularstroma. At the base of the prostate, outer longitudinal fibers of the detrusor fuse and blend with the fibromuscular tissue of the capsule. In surgically resected prostate carcinomas, this complex arrangement can make interpretation of these margins difficult and has led some pathologists to propose that the prostate does not possess a true capsule [44](Epstein, 1989).

Structure

The prostate is composed of approximately 70% glandular elements and 30% fibromuscularstroma. The stromaencircles and invests the glands of the prostate and contracts during ejaculation to express prostatic secretions into the urethra. It is continuous with capsule and is composed of abundant smooth muscle andcollagen.

The glands of the prostate are tubuloalveolar with and are lined with columnaror simple cuboidal epithelium. Scattered neuroendocrine cells, of unknown function, are seen in between the secretory cells. Flattened basal cells line each acinus and are believed to be stem cells for the secretory epithelium. Each acinus is surrounded by connective tissue and stromal smooth muscle[49].

The glandular elements of the prostate have been divided into different zones, by the location of their ducts in the urethra, by their differing pathologic lesions, and, in some cases, by their embryologic origin[47,48.] These different zones is better demonstrable with transrectal ultrasonography. At the angle dividing the preprostatic and prostatic urethra, the ducts of the transition zone arise and pass beneath the preprostatic sphincter to travel on its lateral and posterior sides. Normally, the transition zone contributes about 5% to 10% of the glandular tissue of the prostate. A discrete fibromuscular band of tissue lies between the transition zone from the remaining glandular

compartments and may be visualized at transrectal ultrasonography of the prostate. Benign prostatic hypertrophycommonly arise fromtransition zone, which expands to compress the fibromuscular band into a surgical capsule seen at enucleation of an adenoma. 20% of adenocarcinomas of the prostate arise from transition zone.

The central zone ducts arise circumferentially around the openings of the ejaculatory ducts[47]. This zone comprises 25% of the glandular tissue of the prostate and expands around the ejaculatory ducts to the base of the bladder in a cone shaper. The glands are structurally and immunohistochemically distinct from the remaining prostatic glands (which branch directly from the urogenital sinus),leads to the concept that they arise from wolffian duct[48] . 1% to 5% of adenocarcinomas arise from the central zone and it may also be infiltrated by cancers from adjacent zones.

The peripheral zone, bulk of the prostatic glandular tissue (70%) occupies the posterior and lateral aspects of the gland. Ducts of this zonedrain into the prostatic sinus along the entire length of the (postsphincteric) prostatic urethra[45,46,47]. Seventy percent of prostatic cancers arise in this zone and it is this zone which is most commonly affected by chronic prostatitis.

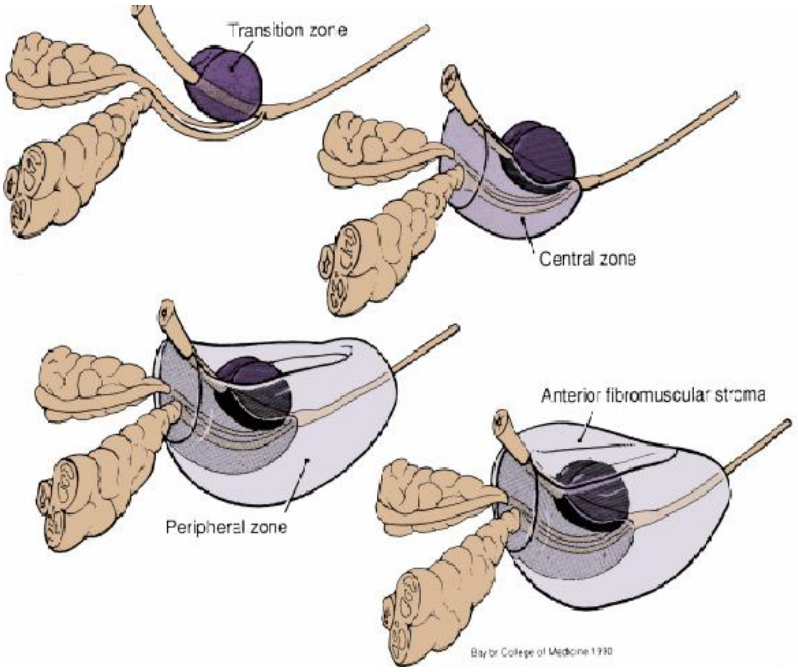


Fig : 1 (McNeal's zonal classification, 1972. [48]

Table: 1 Characteristics of the Human Prostate Zones[48,49]

	Central Zone	**Transition Zone**	**Peripheral Zone**
Volume of normal prostate	25%	5%	70%
Proposed embryonic origin	Wolffian duct	Urogenital sinus	Urogenital sinus
Epithelium	Complex, large polygonal glands	Simple small rounded glands	Simple small rounded glands
Stroma	Compact	Compact	Loose
Origin of prostatic adenocarcinoma	5%	25%	70%
BPH	-	100%	-

Clinically, the prostate is divided into two lateral lobes, separated by a central sulcus, palpable on rectal examination, and a middle lobe, which may project into the bladder in enlarged prostate. These lobes are not histologically defined structures in the normal prostate but are usually dueto the pathologic enlargement of the transition zone laterally and centrally by the periurethral glands.

Vascular Supply

The main arterial supply to the prostate is from the inferior vesical artery**.** In benign prostatic hypertrophy, these arteries provide the principal blood supply of the adenoma[50] (Flocks, 1937). The most significant bleeding is commonly encountered at the bladder neck, particularly at the 4- and 8-o'clock positions during resection.

ETIOPATHOGENESIS OF BPH

Lot of theories has been proposed about etiopathogenesis of BPH, yet nothing is conclusive. Androgens elicit effects in fetal life by acting through androgen receptors (ARs) in urogenital sinus mesenchyme (UGM), which induces prostatic epithelial development. In adulthood, reciprocal homeostatic stromal-epithelial interactions maintain functional differentiation and growth-quiescence. Androgens are not only required for normal function of the prostate gland but also have been implicated in prostate disease as well.[54,7]

Though DHT is the primary growth hormone for prostate, it should be noted that human BPH is not associated with elevated DHT levels. [55] Prostatic growth even in declining androgen levels suggests that other factors from the testis can stimulate prostate growth or sensitize prostatic cells to the effect of androgen.[56] Estrogen may act in combination with other hormones to stimulate prostate cells and cause enlargement of the gland. Estrogen-androgen synergisms as well as a role for other steroidal hormones have also been suggested as mechanisms for BPH. Estrogen action, mediated via ERa, will cause aberrant cellular differentiation and proliferation with progression to prostatic hyperplasia, neoplasia and dysplasia. [57,58,59]

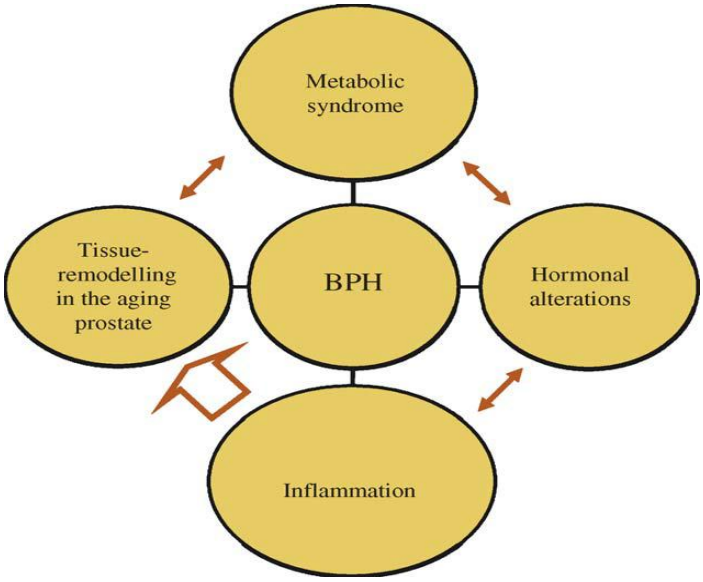


Fig : 2 Etiopathogenesis of BPH.[7]

A study conducted by Cunha et al.[43,57] showed that stromal cells have effect in the differentiation pattern of normal prostatic epithelium.

Aberrent expression of peptide growth factors or their receptors may directly cause uncontrolled growth, resulting in BPH. The stromal cells are the source for secreting growth factors such as fibroblast growth factors, insulin-like growth factors I and II, as well as tumor growth factors, which act in an autocrine manner on the stroma itself as well as in paracrine action on the neighboring glandular cells to induce proliferation.

The prostate glandis influenced by the EGF system . EGF stimulates proliferation of epithelial cells as well as stromal cells derived from the prostate. In the prostate, the EGF system thusplays an important role for stroma-epithelium interactions.[60]

A causative role for inflammation in the pathogenesis of BPH was first suspected in 1937. [61] Three recent reviews have showed an evidence based theories that strongly suggests a role of inflammation towards the propagation of BPH. [62,63,64,65] Kramer and Marberger [66] have recently criticised the current state of knowledge in regard to the influence of inflammation on the pathogenesis of BPH. Chronic inflammatory infiltrates, like activated T cells and macrophages are associated with BPH nodules. These infiltrating cells produces cytokines (IL-2 and IFNγ) which inducesfibromuscular growth in BPH. [67] T cells Immigration induced by proinflammatory cytokines such as IL-6, IL-8 and IL-15. [65] Surrounding cells become targets and are killed (unknown

mechanisms), leaving behind vacant spaces that are replaced by fibromuscular nodules with a specific pattern of a Th0/Th3 type of immune response.

BPH has an genetic component.This theory was supported bySanda and colleagues (1994), who conducted a retrospective case-control analysis of surgically treated BPH patients and control subjects at Johns Hopkins. In a community-based cohort study of more than 2000 men, Roberts and colleagues (1997) found an elevated risk of moderate to severe urologic symptoms in men with a family history of an enlarged prostate and a family history of BPH compared with those with no history.

Pathophysiology of BOO

The partially obstructed urethra, detrusor muscle and the central nervous system function, interact to produce lower urinary tract symptoms (LUTS). These were historically referred to as ‘prostatism’. Benign prostatic hyperplasia (BPH) maycause obstruction through prominent median lobe acting as a ball valve, a dynamic obstruction related to the contractile properties of prostatic smooth muscle, a static obstruction resulting from an enlarged prostate enveloping the prostatic urethra, or a restricted surgical capsule. All these mechanisms lead to increase inintravesical pressure and a reduction in flow which leads to the gradual development of secondary changes in the muscle itself[80,81].

Histologic Features:

BPH is a true hyperplastic process. Histologic studies document an increase in the cell number[48] . In addition, thymidine uptake studies in the dog clearly indicate an increase in DNA synthesis in experimentally induced BPH (Barrack and Berry, 1987). The term benign prostatic hypertrophy is pathologically incorrect.

McNeal's studies demonstrate that the majority of early periurethral nodules are purely stromal in character[49]. The minimal stroma seen initially consists primarily of mature smooth muscle, not unlike that of the uninvolved transition zone tissue. These glandular nodules are apparently derived from newly formed small duct branches that bud off from existing ducts, leading to a totally new ductal system within the nodule. This proliferative process leads to a clumping of glands within a given area as well as an increase in the height of the lining epithelium.

During the first 20 years of BPH development, the disease characterized by an increased number of nodules, and the subsequent growth of each new nodule is generally slow[48,49, 54]. Then a second phase of evolution occurs in which there is a significant increase in large nodules.

There is significant pleomorphism in stromal-epithelial ratios in resected tissue specimens. Studies from primarily small resected glands

demonstrate a predominance of fibromuscularstroma[54,67, 68]. Larger glands, predominantly those removed by enucleation, demonstrate primarily epithelial nodules[69]. However, an increase in stromal-epithelial ratios does not necessarily indicate that this is a "stromal disease"; stromal proliferation may well be due to "epithelial disease."

Importance of Prostatic Smooth Muscle

Prostatic smooth muscle represents a significant volume of the gland[68.] Though, spatial arrangement of smooth muscle cells in the prostate is not optimal for force generation,both passive and active forces in prostatic tissue play a major role in the pathophysiology of BPH[68] . The elastic elements in the stromal and epithelial cells and (most important) the ECM contribute to passive tissue force, independent of active smooth muscle contraction. However, adrenergic nervous system stimulation results in a dynamic increase in prostatic urethral resistance. Blockade by α-receptor blockers clearly diminishes this response, but not the passive tension in the prostate, which may be an equal determinant of urethral resistance..α-Adrenergic blockade in patients with documented BPH causes a significant down regulation of normal contractile protein gene expression, specifically smooth muscle myosin heavy chain[70,71].

Effect of obstruction on the bladder:

In early phases of obstruction, hypertrophy of the detrusor muscleincreases detrusor pressure in order to maintain flow in the

presence of increased outflow resistance. With persistent obstruction however decreased compliance in the bladder wall and impaired emptying occur owing to the deposition of extracellular matrix (ECM) [72]. This effect contributes to the decreased smooth muscle contractility and resulting in development of abnormal smooth muscle phenotype[74]. Acute urinary retention may occur during the process and may be related to bladder failure, as well as to sudden increase in outflow obstruction.

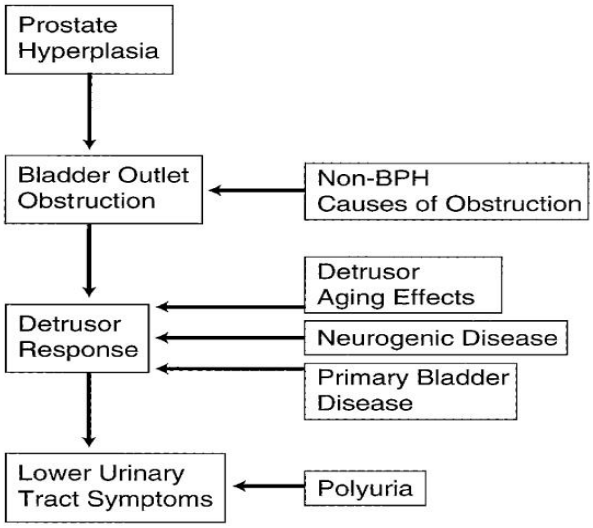


Fig. 3 : The pathophysiology of BOO(Adapted from Wein: Campbell-Walsh Urology,10th ed.Physiology and Pharmacology of the Bladder and Urethra:Roehrborn CG; Chapter 91; p2579)

Natural History of Benign Prostatic Enlargement:

The natural history of a disease refers to the progression of disease over timeifuntreated. Clinical endpoints of BPH include bladder dysfunction manifested by incomplete emptying or detrusor instability,

more severe bladder outlet obstruction, acute urinary retention (AUR), recurrent UTI, urosepsis, chronicrenal insufficiency, bladder stones, incontinence and hematuria.

The natural history of benign prostatic enlargement was obtained from the longitudinal follow-up of the Olmstead County Study of Urinary Symptoms and Health Status[75].A relatively small subset of men between the ages of 40 and 79 were randomly selected from the Olmstead County community and underwent transrectal ultrasonography at baseline 9 and 6 years later. A mixed-effects regression model showed that prostate volume increased by about 1.6% per year on average.

Men with larger prostatesize at start of the study experiencedmore increase in prostatic volume. Jacobsen and colleagues[76] reported on LUTS progression in the Olmstead County Study over an interval of 42 months. The AUA symptom score was categorized as mild (0-7) versus moderate to severe (8-35). At 42 months, 22% of men with mild symptoms crossed over to moderate to severe symptoms. A regression model showed that the average symptom score change over time was 0.18 symptom units per year. The AUA symptom score increased during this interval of time in all age categories. The greatest mean symptom score progression was observed in the 60- to 69-year old age group.

The Medical Therapy of Prostatic Symptoms (MTOPS) study represents the longest placebo-controlled trial to date of men with

BPH.[77]Prostate volume was not an inclusion criterion in this study. The placebo arm provides insights into the natural history of men with moderate to severe LUTS and decreased peak urinary flow rates. The objective of the MTOPS study was to examine the impact of medical therapies on BPH progression. In this study, BPH progression was defined as a 4-point increase in AUA symptom score or the development of AUR, chronic renal insufficiency or socially unacceptable incontinence, or recurrent UTI or urosepsis. The final analysis conducted with a mean follow up of 4.5 years, which shows only clinically relevant progression rates were observed for symptom progression and AUR. The overall progression rate (events/100 patient-years) was 4.5 in the placebo group. The MTOPS study demonstrated that the development of AUR is quite common in men with clinical BPH. This is consistent with the Olmstead County Study of Urinary Symptoms and Health Status, which reported a cumulative incidence rate for AUR of6.8 Per thousand person-years. With a multivariate analysis, age at baseline, symptom severity and peak flow rate independently predicted risk of AUR.

Lower Urinary Tract Symptoms

Lower urinary tract symptoms has become the preferred term for urinary symptoms, instead of "symptoms of benign prostatic hyperplasia" and "prostatism" which were previously used to describe lower urinary tract symptoms [80].

According to the International Continence Society (ICS), lower urinary tract symptoms denote three things: a symptom, perceived by the patient; a sign, observed by the physician; and a condition, defined by urodynamic observations [81].

In the present definition, ICS divides lower urinary tract symptoms into three groups: storage symptoms experienced when urine is stored in the bladder, voiding symptoms experienced during the voiding phase and post micturition symptoms experienced immediately after micturition[82].

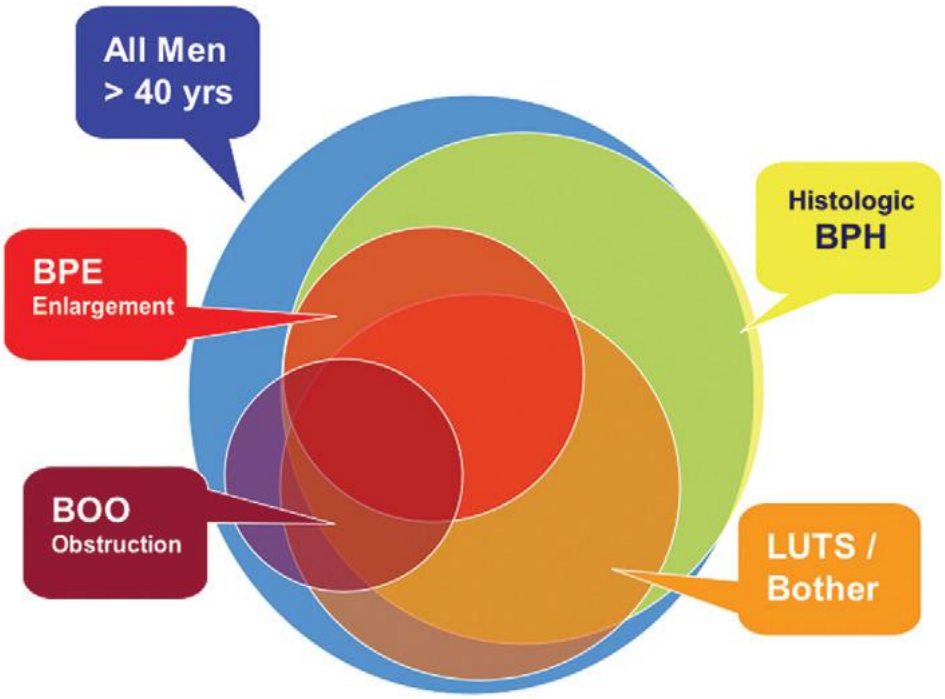


Fig. 4 : From Roehrborn CG. Pathology of benign prostatic hyperplasia.Int J Res 2008;20[Suppl. 3]:S11–8.)77.

Assessment of Lower Urinary Tract Symptoms

Attempt to measure the impact of lower urinary tract symptoms on life leads to formulation of many scoring systems.

The Boyarsky Score [83] is the questionnaire, first published to assess lower urinary tract symptoms. The questionnaire is designed to be completed by the physician and has never been validated. It evaluatesthe severity of nocturia, frequency, hesitancy, intermittency, terminaldribbling, urgency, reduction of the size and force of the stream, dysuria and incomplete voiding.

The Madsen-Iversen Score [84] is another unvalidated questionnaire, also designed for completion by the physician. The questionnaire assesses urinary stream, straining to void, hesitancy, intermittency, bladder emptying, stress incontinence or post void dribbling, urgency, frequency and nocturia. The importance of the patient's perception of the symptoms has been recognized and new instruments for assessing severity, frequency and quality of life of lowerurinary tract symptoms have been designed. Health measurements or scales can be used to directly inquire about the impact of the symptoms or the distress they cause.

The International Prostate Symptom Score (IPSS) questionnaire [85] is a validated instrument that measures the occurrence of seven symptoms from the lower urinary tract (incomplete emptying, frequency, urgency,

nocturia, straining, weak stream, hesitancy). The IPSS Questionnaire includes one separate question concerning the quality of life, graded on a scale from 0 to 6.

The American Urological Association (AUA) symptom index is a validated questionnaire and includes seven questions covering frequency, nocturia, weak urinary stream, hesitancy, intermittency, incomplete emptying and urgency and two questions on quality of life [82].

The ICS male SF questionnaire includes 11 questions on lower urinary tract symptoms (hesitancy, straining, decreased stream, intermittency, incomplete emptying, urgency, urge incontinence, stress incontinence, unpredictable incontinence, nocturia, post-void dribbling)and one question on quality of life [86].

The Danish Prostatic Symptom Score (DAN-PSS) [87] measures the 12 symptoms of lower urinary tract. Moreover, it evaluates the symptoms both quantitatively and qualitatively, using both a symptom score and a distress score. This scoring system has a sensitivity of 92% and aspecificity of 94% [88,89]. The DAN-PSS questionnaire also measures the occurrence of dysuria, post micturition dribbling and urinary incontinence, as well as measuring activities of daily living, none of which are covered by the IPSS questionnaire[90].The DAN-PSS questionnaire is well understood by men 40 years or older [91] and is reliable and valid for the same purposes as the IPSS questionnaire

(Hansen et al. 1998). At the ICS conference in Tampere2000, Koskimaki and co-workers presented data showing that the correlation coefficient between total DANPSS score and total IPSS score was 0.70 [92].

Lower Urinary Tract Function of Ageing

Age-related changes in the central nervous system and the organs adjacent to the bladder increase the risk for lower urinary tract symptoms[93]. Alterations in nervous system e.g. Parkinson's disease, often associated with aging, places the elderly individuals at risk for developing lower urinary tract symptoms [94,95.]

The drugs used for neurologic or functional disease may cause lower urinary tract symptoms in individuals with an otherwise healthy lower urinary tract[93].

Prevalence of Lower Urinary Tract Symptoms

The overall prevalence of symptoms of the lower urinary tract differs in published reports [97,98,99,100,101]. One explanation for the variation could be that different symptoms are included. Many of these studies took into account of urinary incontinence alone, but somestudies have considered other lower urinary tract symptoms also. Other explanation for the apparent difference in prevalence is the selection of the population. Sometrials have selected their samples from patients listed in general practice, visiting other than urology clinics or selected from health care

district[98, 99]. Selection of a study population that includes everyone living within a certain geographical area gives a more accurate estimateof prevalence than studies where the population is selected from among patients attending a physician's office.

Uroflowmetry

Uroflowmetry is a simple, screening procedure used to measure the flow rate of urine in relation to time. This test is simple and noninvasive.It is a common, noninvasive urodynamic test used in the diagnostic evaluation of patients presenting with symptoms of BOO[96].

Uroflowmetry is performed by having a person urinate into a closet that is connected to asensor instrument with a measuring jar. This mechanism calculates the amount of urine, flow rate in seconds and length of time until completion of the void. This informationis converted into a graph and interpreted by a physician. The values vary depend on the person's gender and age. The information helps to evaluate function of the lower urinary tract or determine if there is an obstruction of normal urine outflow[96].Siroky and coworkers (1979) concluded that Uroflowmetry was able to distinguish physiologically unobstructed and obstructed patients.

During normal urination, the initial stream starts slowly but almost immediately speeds up until the bladder is nearly empty. The urine flow then slows again and the bladder is emptied. In persons with a urinary

tract obstruction, this pattern of flow is alteredmore gradually. This informationis made into graph and the results are analysed.The urinary flow rate is recorded as an electronic wave throughout the course of micturition. The specificity of this test is low, For example, an abnormally low flow rate may be caused by an obstruction (e.g., hyperplastic prostate,urethral stricture, meatal stenosis) or by detrusor hypocontractility.

The AHCPR Guideline Panel conclusions regarding uroflowmetry[96].

- Flow rate measurements are validonly if the voided volume is morethan 150mL.

- Uroflowmetry is the single best noninvasive urodynamic test to detect lower urinary tract obstruction, but cut off values are not defined accurately.

- Age or volume correction is not currently recommended for clinical practice.

- The peak flow rate (PFR; Qmax) more specifically identifies patients with BPH than does the average flow rate (Qavg).Scott and coworkers (1967) and Shoukry and associates (1975) found that Qmax correlated better than symptoms with the presence or absence of obstruction as determined by pressure-flow studies.

- A Qmax of less than 15 mL/s denotes presence of either obstruction or bladder decompensation. Gleason and colleagues (1982) found that Qmax distinguished between normal men and

patients with BPH, urethral stricture, or prostatitis. They also noted that a subgroup of patients with a decompensated detrusor muscle could not be separated from the obstructed men on the basis of Qmax alone.

Abrams and associates (1997) studied the value of uroflowmetry before prostatectomy. Failure rates for surgery were found to decrease with the addition of flow rate measurement to symptom assessment in preoperative evaluation[96].

In a study, where the flow rates were studied before and 6 months after prostatectomy (Jensen et al, 1988a), subjective evaluation revealed an overall symptomatic improvement rate of 80% after surgery. The difference in success rates for men falling above or below the cutoff value of Qmax = 10 mL/s was not significant (P = .2). When a Qmax cutoff of 15 mL/s was used, success rates for men above or below the cutoff value differed significantly.

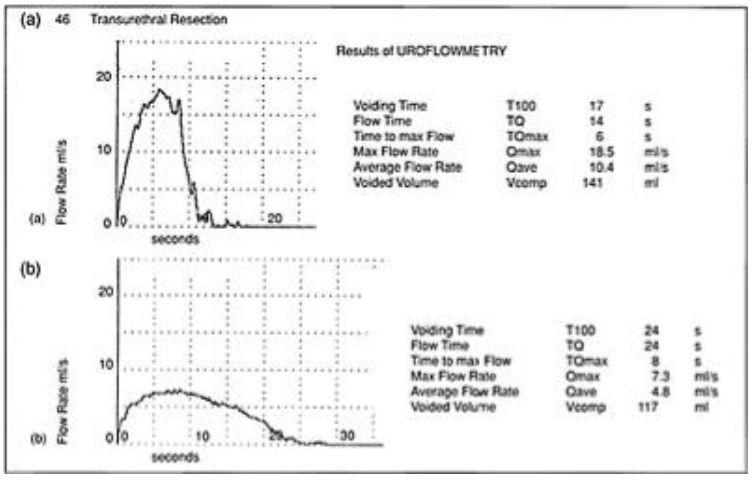


Fig : 5 Uroflow patterns.

McLoughlin and coworkers (1990) , using urodynamic testing and a cutoff value of 12 mL/s, evaluated 108 men with clinical BPH before and 1 year after surgery and considering Qmax less than 12 mL/s as cut off for obstruction, only 3% of patients would have been subjected to an unnecessary TURP. They are also not recommending the routine use of pressure-flow studies or cystometrograms but that the screening of flow rates. These tests may be considered patients with a Qmax of greater than 12 mL/s.

Till now, a cut off level for obstruction (e.g., based on the BOOI) has not been defined. No evidence-based studies suggest when surgical relief is indicated to prevent bladder decompensation.

Gland size

Size of Prostate gland can be measured transrectally or suprapubically. Although suprapubic measurement of prostate volume is less than ideal, it correlates well with transrectal measurement. Lepor et al showed gland volumes not correlated with AUA symptom score and only weakly related to peak flow rate[102].Although there is no direct evidence of large prostates causing BOO in noncatheterized patients, those presenting with acute retention had successful trial without catheter provided the prostate size was smaller[103]. Thus, there is indirect evidence that larger prostates tend to be obstructive.

Postvoid Residual Urine

Postvoid residual (PVR) urine is the volume of urine remaining in the bladder immediately after the completion of micturition. Studies indicate that PVR urine normally ranges from 0.09 to 2.24 ml, with the mean being 0.53 ml. Seventy-eight percent of normal men have PVRs of less than 5 ml and 100% have volumes of less than 12 ml.

Facts about PVR :

- Residual urine volume measurement has significant intra/inter individual variability hence, its clinical usefulness is limited.
- Residual urine volume does not correlate well with other signs or symptoms of clinical BPH.
- Large residual urine volumes associated with higher failure rate for watchful waiting. But cut off volume predicting a poorer outcome is not defined.
- It does not detect impending bladder or renal damage.

The Fourth International Consultation initially recommended PVR determination in the initial assessment and during monitoring of patients under watchful waiting or other conservative treatment regimens[96].

PVR measurement can be done using noninvasive (ultrasound) and by invasive (catheterization) methods. The most common method usedis

ultrasound. Invasive techniques are accurate if performed correctly but with complication like urethral injury, UTI, and transient bacteremia .The mean difference between estimated PVR and “true” PVR (i.e., by catheterization) was 6.9 mL in 39 measurements taken in 20 children with neurogenic bladders (Massagli et al, 1990). In 164 measurements in adult patients, the correlationcoefficient was 0.79 (Ireton et al, 1990).

TURP, as we know today, was developed in the United States in the 1920s and 1930s. Nesbit (1975) pointed out several significant factors important in its development: (1) invention of the incandescent lamp by Edison in 1879; (2) cystoscope, developed independently by Nitze and Lieter in 1887; and (3) development of the fenestrated tube by Hugh Hampton-Young, which allowed the obstructing tissue to be sheared off blindly.

TURP is the gold standard for the surgical management of BPH.

TECHNIQUE OF TRANSURETHRAL RESECTION OF PROSTATE several techniques of transurethral resection have been described. The goal of TURP is to remove the obstructing tissue while minimizing damage to surrounding structures

Nesbit resection technique

The Nesbit technique[107] is probably the best and most commonly performed TURP method. It was first described by Reed M. Nesbit of

Michigan in 1943 .The procedure is divided into 3 stages: (1) proximal orintravesical, (2) extravesical and (3) apical.

Resection begins by removing the intravesical portion of the prostate and bladder neck tissue .

Then, gland resected from ventrally 11 – 1'o clock region towards 6'o clock both side. The prostatic capsule is the lateral limit of resection. Surgical removal starts at the proximal end. In the apical stage, the apical tissue around the verumontanum isremoved atlast.

Milner resection technique[108]

The resection started at the 9-o'clock position and proceededup to capsular fibers. The groove extends from the bladder neck to a point parallel to the verumontanum. The groove is extended upwards toward the 11-o'clock position and then downward toward the 7-o'clock position. Resection started from the lateral lobe tissue from the inside out quickly and to reach the surgical capsule , where the perforating and bleeding vessels can be cauterized if necessary. When both lateral lobes are resected, the posterior and median lobes are removed similar to Nesbit technique.

Complications of TURP

Table 2: Complications of TURP

Complication in percentage	Mebust 1989	Doll 1992	Haupt 1997	Kuntz 2004
Capsular perforation	0.9	10	-	4
Transfusion	6.4	22	2.2	2.0
TUR syndrome	2.0	-	0.3	0
Clot retention	3.3	11.0	1.9	5.0
Urosepsis	0.2	3.0	0.2	0
Failure to void	6.5	3.0	-	5.0
incontinence	-	38	0.3	1.0

These results reveals complications following TURP in different time periods. Doll etal study results reflects their aggressive surgical technique. Recent study by Kuntz etal revealed increase in compliance of the patient for follow up.

Bleeding

Arterial bleeding can be more in cases of preoperative infection or urinary retention because of a congested gland. Anti-androgen pretreatment with finasteride or flutamide may reduce bleeding. Venous bleeding due tovenous sinusoid openings and capsular perforation. The amount of intraoperative bleeding depends on gland size and resection weight. In Mauermeyer approach the vessels at 5 and 7 o'clock are controlled early; Nesbit technique aims to first reach the capsule at the 11 and 1 o'clock positions

Post-void residual volume

Both surgical procedures allow a reduction of the post-void residual volume of more than; 60% after TURP and 55% after TUIP [107].

Incontinence

Early incontinence may occur in up to 30–40% of patients, late iatrogenic stress incontinence occurs in fewer than 0.5% of patients[107].

Urethral stricture

The rate of urethral stricture varies from 2.2% to 9.8%. There is relationship to operative time periods and size of instrument.

The etiology of stricture formation depends on the site of stricture

* Meatal strictures usually occur due to an inappropriate relationship between the size of the instrument and the diameter of the urethral meatus.

* Bulbar strictures occur because insufficient isolation by the lubricant causes the monopolar current to leak.

Bladder neck stenosis

The incidence varies from 0.3% to 9.2%, usually after smaller glands (<30 g) are treated[110].

Retrograde ejaculation

Retrograde ejaculation occurs in 53–75% patients. Retrograde ejaculation might be avoided if the tissue around the verumontanum is spared during resection[107,111].

Erectile dysfunction

High Frequency-generated current close to the capsule may damage the neurovascular bundles. The rate of impotence varies from 3.4 to 32% in the Literature109

Intra and peri-operative mortality following prostatectomy is less than < 0.25%.

The risk of a TUR-syndrome is in the range of 2%. Risk factors for TUR-syndrome are excessive bleeding with opening of venous sinuses, prolonged operation time, large glands and past or present smoking. The estimated need for blood transfusion following TURP is in the range of 2-5%.

TUIP has been available since the 19th century. Edwards and colleagues (1985) credit Bottini with describing the technique in 1887, but Hedlund and Ek (1985) credit Guthrie in 1834. Guthrie's technique was to disrupt the bladder neck, whereas Bottini used diathermy to divide it. However, in 1973, Orandi104 published the first significant series on TUIP. The procedure seemed to be most useful in those who had a small

prostate and who had obstructive bladder outflow symptoms. Classically, the patient was a younger man when compared with those having a TURP. Turner – Warwick popularized the procedure in Europe[105].

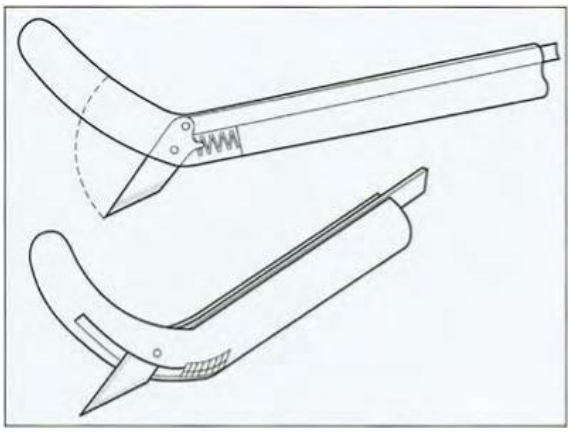


Fig.6 :Guithre's knife

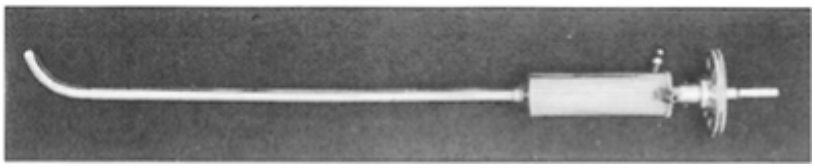


Fig.7 : Bottini'slithotrite for heating the prostate

Technique

The surgical technique is relatively simple. Using a Collings knife, an incision is made at the 5 and 7 o'clock positions or on one side of the midline only. It starts just distal to the ureteral orifice and ends just proximal to the verumontanum. The incision depth should be to the point at which fine fibers of the external capsule are seen. Care must be taken not to incise too deeply because extravasation of irrigation fluid or rectal

injury may occur. With completion of the incisions and with the scope in the more distal urethra, there should be no visible obstruction to the bladder outflow.

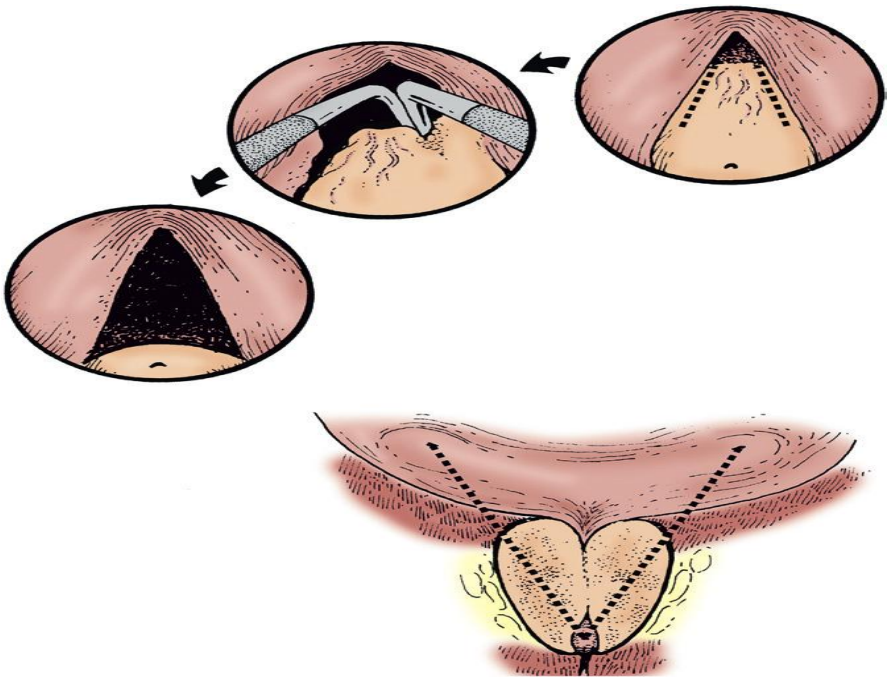


Fig 8 : Method of TUIP

Lourenco et al[111] reviewed data from 795 randomised participants across 10 Randomized Control Trials of moderate to poor quality 8 of which stated an upper limit for prostate size. No difference in the degree of symptomatic improvement was seen between the two procedures. Improvement in peak urine flow rate was lower for TUIP compared to TURP whilst the rate of blood transfusion and TUR syndrome was higher after TURP. Urinary retention, urinary tract infection, strictures and incontinence did not differ between the two approaches, although clinically important differences could not be ruled-out. TUIP was

associated with a shorter duration of operation and length of hospital stay but a higher re-operation rate.

They concluded that TUIP and TURP appear to offer equivalent symptomatic improvement for men with mild to moderate BPE. Choosing TUIP involves a trade-off between the lower risk of peri-operative morbidity and the higher risk of subsequent re-operation.

Retreatment rate :

The retreatment rate of TURP is lower than therates of other alternatives such as TUIP (3–14.5% after five years)[110]

Table 3 : Reoperation after treatment with TURP and TUIP[111]

Study	TUIP			TURP		
	Number of patients	**reoperation**	**percentage**	**Number of patients**	**reoperation**	**percentage**
Aliaga .R[34]	21	1	4.8	20	1	5
Dolfinger[25]	31	1	3.2	29	6	20.7
Nielsen[28]	25	-	-	24	3	12.5
Riehmann[29]	56	9	16	60	13	21.6
Saporta[30]	20	0	0	20	3	15
Jahnson[27]	42	3	7.1	43	10	23.2

These results revealed increased reoperation rate in TUIP than TURP. In Riehmann series follow up period was 18 months but Nielsen series it was only 3 months. Most common reason following TURP was bladder neck stenosis. In TUIP it was adhesion between gland edges.

Barry et al [106] in his landmark study compared both the procedures and gave the comparative data as follow.

Table 4 :Treatment Outcomes Balance Sheet[110]

Factors analysed	TUIP	TURP
Chance of symptom improvement	78-83% (80)	75-96% (88)
Degree of symptom improvement	73%	85%
Morbidity (20% significant)	2.2-33% (14)	5.2-30.7% (16)
Mortality (30-90 days)	0.2-1.5%	0.53-3.31%
Incontinence—total	0.061–1.1%	0.68-1.4%
Operative treatment for surgical complications	1.34-2.65%	0.68-10%

Stamey's in 1993 proposed that 'TURP is now a therapy of history' may turn out true atleast in case of small gland disease.

Ten Randomized Control Trial`s comparing TUIP to TURP are available[26-32,34,39]. They showed similar improvements of LUTS in patients with small prostates (< 20-50 grams). TUIP has several advantages over TURP, such as a lower incidence of complications, minimal risk of bleeding and blood transfusion, decreased risk of retrograde ejaculation and shorter operating time and hospital stay. TURP comprises 95% of all surgical procedures and is the treatment of choice for prostates sized 30-80 gms. Intra- and postoperative complications are correlated with the size of the prostate and the length of the procedure. Long term trials revealed reoperative rate is more with TUIP.

MATERIALS AND METHODS

1. Study group :

Patients who were admitted with bothersome lower urinary tract symptoms (LUTS) due to benign prostatic hyperplasia at 1. Kilpauk Medical College Hospital and 2. Government RoyapettahHospital between 2010 - 2011were included in the study group.

2.Study design : Prospective Randomised Clinical study

3.Materials :

Inclusion criteria :

Patients with Bothersome LUTS due to BPH

IPSS score more than 7

Prostate size less than 35gms

Exclusion criteria :

Patients with

- Hematuria
- Previous history of bladder/transurethral surgery
- Vesical calculi

- Uncontrolled diabetes mellitus
- Elevated renal parameters
- Neurogenic Bladder
- Cases of BPH,who do not come under inclusion criteria.

Patient Evaluation:

All patients with LUTS symptoms were graded according to International Prostate Symptom (IPSS) scoring system,quality of life score were also recorded. Complete history and physical examination was done.

Prostate size was determined by digital rectal examination (DRE) and Ultrasonography(Philips HD 6.1) using Prostate ellipsoid formula

(Prostate size in gm= $\pi/6$ ×anteroposterior × transverse × sagittal diameter).

Urinalysis, Complete Hemogram, Blood Urea and Serum Creatinine were measured.Uroflowmetry(LaborieDelphis KT)was donepre and postoperatively in all cases who did not have Urinary retention.PSA level was measured only in patients with suspicion of carcinoma by DRE or USG findings.

Urodynamic evaluation was done only in cases suspected for neurogenic cause.

All patients underwent Preoperative anaesthetic evaluation for fitness to undergo regional as well as general anaesthesia.

The procedure was done under spinal anesthesia, with the patient in lithotomy position.

First, cystoscopy was done using Storz 20Fr sheath with 30 degree telescope to assessthe urethra, bladder as well as prostate. By using, 24 Fr sheath with Baumrucker working element with loop or Colling's knife (Storz) both procedures were done. The procedureswere done by surgeons who are experienced in transurethral surgeries.

Patients were randomly selected (alternate patient)into two groups (TUIP vs TURP)

In TURP group, resection was done up to anatomic capsule of the prostate using conventional technique. In TUIP group, two deep incisions, at 5- and 7-0'clock positions were made using Colling's knife. Incisions were made from the trigone just below the ureteral orifices, cutting the bladder neck and prostate to the sides of proximal end of verumontanum. Incision deepened up to the point at which fine fibers of the external capsule are seen. Sterile water was used as irrigation fluid. At the end of procedures, a 22-Fr three way Foley catheter was passed, balloon inflated to 30 - 40ml of distilled water and connected to a closed drainage system. Traction was applied to TURP group and not applied to

TUIP. Postoperatively, continuous bladder irrigation with normal saline was continued till return became fairly clear.

In every patient, total operating time, amount of irrigation fluid used in liters and the amount of blood transfusion required were observed and recorded. Postoperative catheterization period noted.

Every patient was followed up for three months postoperatively. Follow up studies included patients' subjective evaluation of outcome of operation and detailed symptoms score (IPSS). Uroflowmetry and Ultrasonography were done for each patient to find out maximum flow rate and post void residual volume of urine respectively.

Collected data were subjected to statistical analysis.

Statistical Package for the Social Sciences, version 12.0.2 (SPSS Inc, Chicago, IL, USA) was used for the statistical analysis

RESULTS

We planned to evaluate the efficacy of TUIP as a treatment modality for small size(35 grams) obstructive BPH and to compare its outcome with that of TURP in our institution.

In our study, total of 60 patients were included who fulfilled the inclusion criteria. They were randomly selected into two groups which consisted of 30 patients each.

Preoperative, intraoperative and postoperative variables were collected and analysed.In study group 1(TUIP) 4 patients were lost tofollow up and in group2(TURP) 3 patients were lost to follow up.

Statistical Package for the Social Sciences, version 12.0.2 (SPSS Inc, Chicago, IL, USA) was used for the statistical analysis. Level of significance is considered with the P value < 0.05.

Age group : Both the TUIP and TURP arms of the study were matched for appropriate age. The mean age for group 1 (TUIP) was 67.54 years and group 2 (TURP) was 65.07 years.

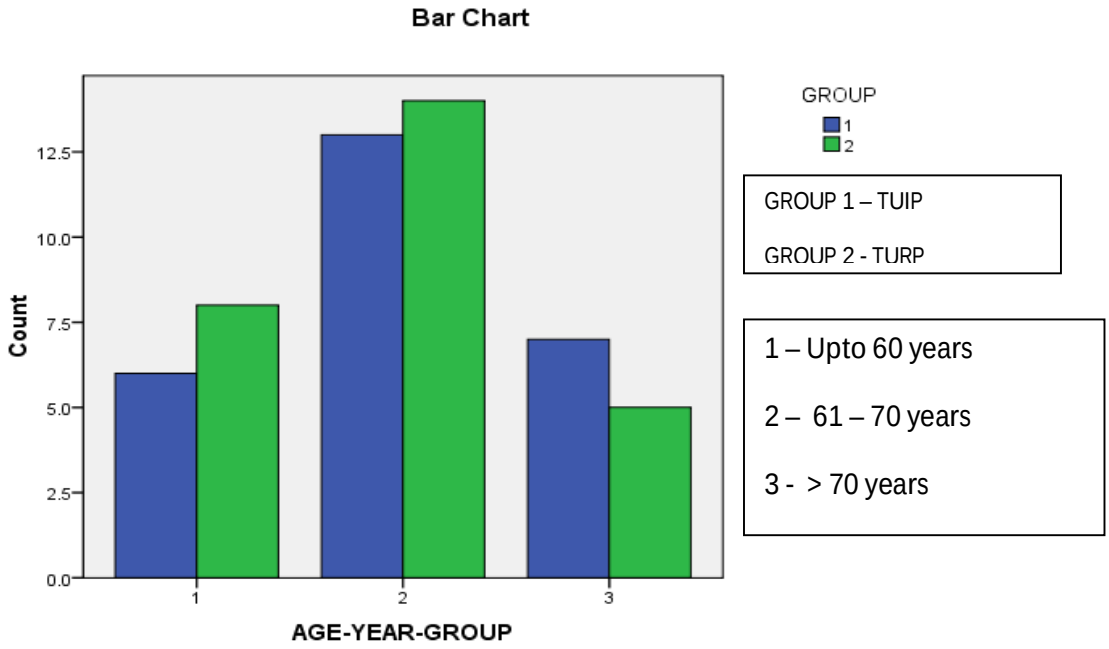


Fig 9 : Age distribution.

Age distribution:

Most of the patients in both groups belong to 61 to 70 years age group

Table – 5 : Age Distribution

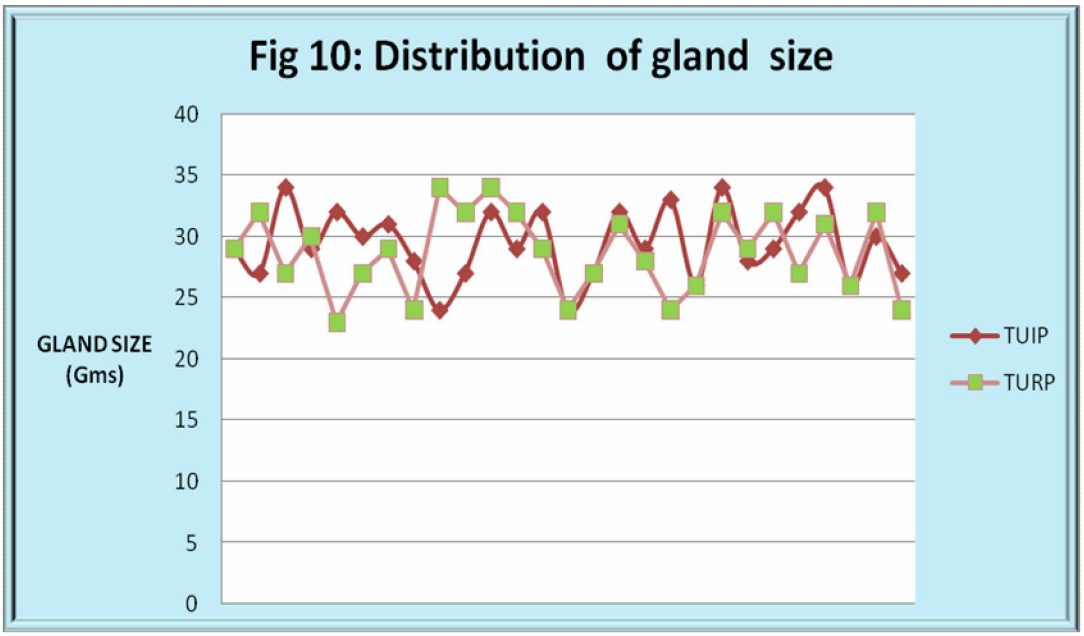
			GROUP		
			1	**2**	**Total**
AGE-YEAR-GROUP	UPTO 60	Count	6	8	14
		% within AGE-YEAR-GROUP	42.9%	57.1%	100.0%
		% within GROUP	23.1%	29.6%	26.4%
		% of Total	11.3%	15.1%	26.4%
	61-70	Count	13	14	27
		% within AGE-YEAR – GROUP	48.1%	51.9%	100.0%
		% within Group	50.0%	51.9%	50.9%
		% of Total	24.5%	26.4%	50.9%

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**
AGE -YEAR	Equal variances assumed	.107	.745	1.376	51	.175
	Equal variances not assumed			1.374	50.431	.176

There was no statistical significance between the various age groups between TUIP and TURP arm as shown by a p value of 0.175.

Size of the gland:

Mean volume of the prostate gland as measured by ultrasonogram was found to be 28.58 grams in group 1 and 29.44 gramsin group 2 with no statistical significance.(p = 0.315)



IPSS

Symptom score improved from mean preoperative value of 25.73 to postoperative value 8.08 in group 1 (TUIP) showing a statistical significance with a p value of 0.004

Symptom score improved from mean preoperative value of 25.41 to postoperative value 6.67 in group 2 (TURP) showing a statistical significance with a p value of 0.028.

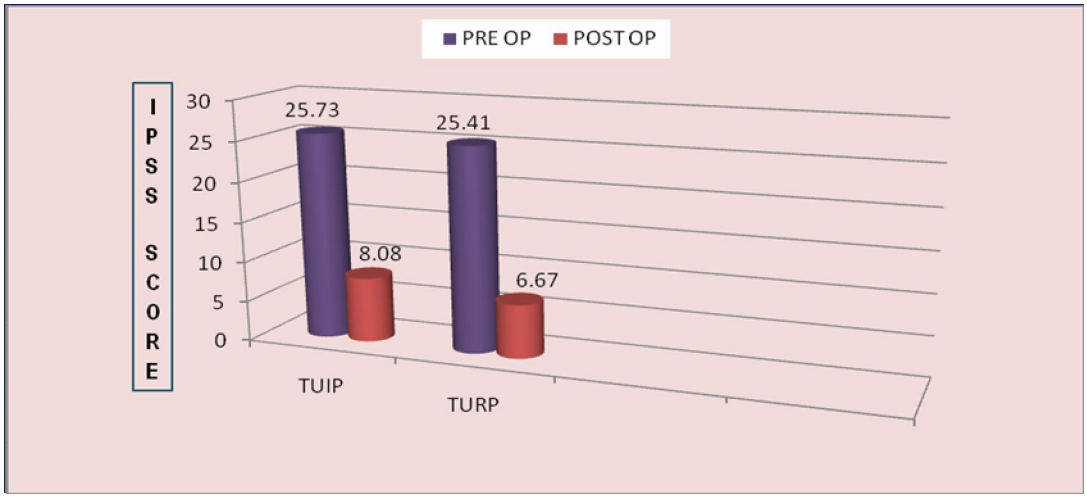


Fig. 11:PRE & POSTOPERATIVE IPSS SCORE

Table – 6 : Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
PRE-OP-IPSS	1	26	25.73	2.808	.551
	2	27	25.41	3.555	.684
POST-OP-IPSS	1	26	8.08	3.969	.778
	2	27	6.67	1.144	.220

Comparison between the mean of improvement in IPSS

The mean of difference between pre-op and post-op IPSS (improvement) in group 1- 17.65 and group 2 – 18.74 showing no statistical significance with p value of 0.239

Table 7 : Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
IPSS-DIFFERENCE	1	26	17.65	3.393	.666
	2	27	18.74	3.241	.624

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	Df	Sig. (2-tailed)
IPSS-DIFFERENCE	Equal variances assumed	.433	.514	-1.193	51	.239
	Equal variances not assumed			-1.192	50.641	.239

Quality Of Life:

QOL improved from mean preoperative value of 4.23 to postoperative value 1.42 in group 1 (TUIP) showing a statistical significance with a p value of 0.00

Symptom score improved from mean preoperative value of 4.15 to postoperative value 1.07 in group 2 (TURP) showing a statistical significance with a p value of 0.00.

Table – 8 : Group - 1 Pre & Post comparison Paired Samples Test

		t	df	Sig. (2-tailed)
Pair 1	PRE-OP-IPSS - POST-OP-IPSS	26.527	26	.000
Pair 2	PRE-OP-QOL - POST-OP-QOL	22.593	26	.000
Pair 3	PRE OP-PEAK FLOW RATE-ml - POST OP-PEAK FLOW RATE-ml	-16.855	26	.000
Pair 4	PRE OP-POST VOID RESIDUE-ml - POST OP-POST VOID RESIDUE-ml	8.754	26	.000

Table – 9 : Group - 2 Pre & Post comparison Paired Samples Test

		t	df	Sig. (2-tailed)
Pair 1	PRE-OP-IPSS - POST-OP-IPSS	30.042	27	.000
Pair 2	PRE-OP-QOL - POST-OP-QOL	29.067	27	.000
Pair 3	PRE OP-PEAK FLOW RATE-ml - POST OP-PEAK FLOW RATE-ml	-24.502	27	.000
Pair 4	PRE OP-POST VOID RESIDUE-ml - POST OP-POST VOID RESIDUE-ml	7.646	27	.000

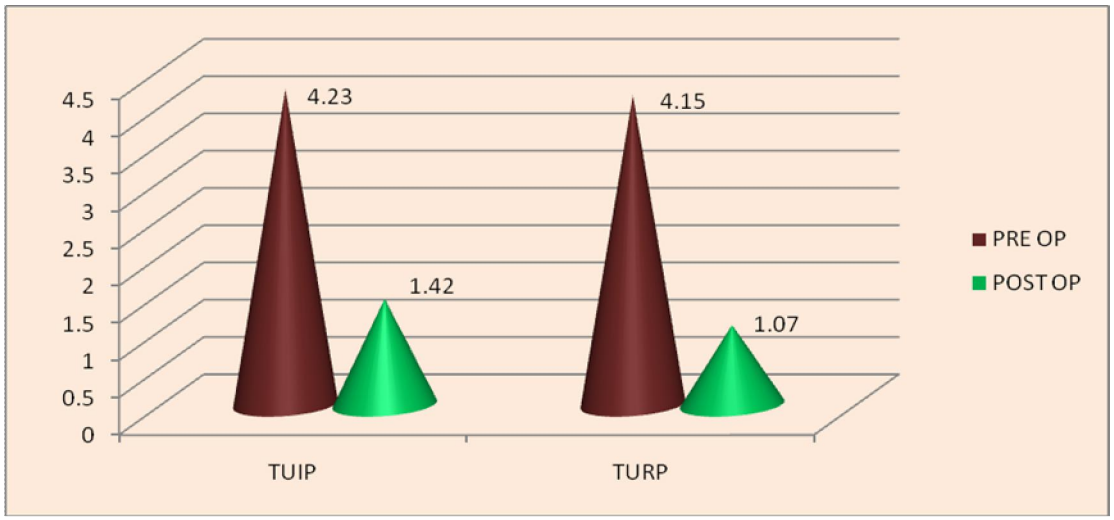


Fig 12 : PRE & POST OP QOL SCORE

Comparison between the mean of improvement in QOL:

The mean of difference between pre-op and post-op QOL (improvement) in group 1 was 2.81 and group 2 was 3.07 showing no statistical significance with p value of 0.452

Table 10 : Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
QOL-DIFFERENCE	1	26	2.81	.634	.124
	2	27	3.07	.550	.106

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**
PRE-OP-QOL	Equal variances assumed	2.352	.131	.758	51	.452
	Equal variances not assumed			.756	48.893	.453
POST-OP-QOL	Equal variances assumed	16.885	.000	1.844	51	.071

Peak Flow Rate:

PFR improved from mean preoperative value of 6.238 to postoperative value 16.396 in group 1 (TUIP) showing a statistical significance with a p value of 0.00 (Ref.Table - 8)

PFR improved from mean preoperative value of 6.367 to postoperative value 19.176 in group 2 (TURP) showing a statistical significance with a p value of 0.00 (Ref. Table – 9).

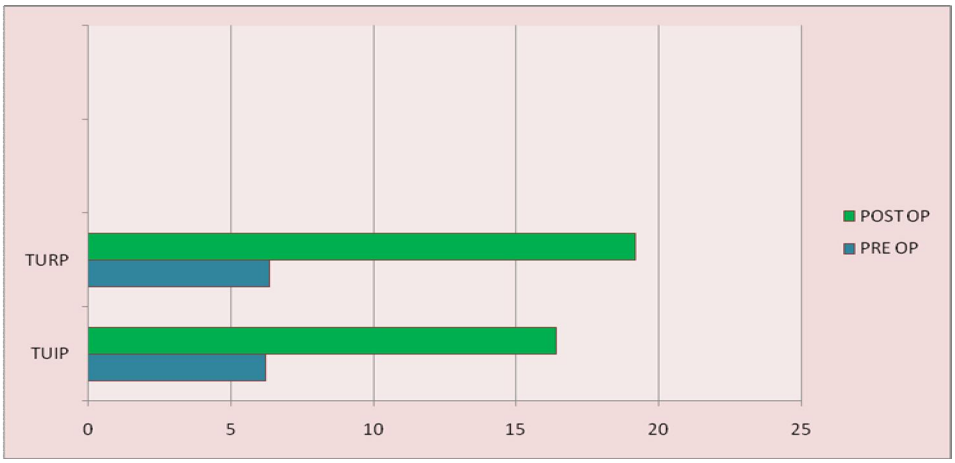


FIG. 13:PRE& POST OPERATIVE PEAK FLOW RATE

The mean of difference between pre-op and post-op PFR (improvement) in group 1- 10.16 and group 2 – 12.81 showing no statistical significance with p value of 0.749

Table 11 :Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	**Sig.**	**t**	**df**
PEAK FLOW RATE-ml-DIFFERENCE	Equal variances assumed	.103	.749	-3.329	51
	Equal variances not assumed			-3.322	49.712

Post Void Residual urine:

PVR improved from mean preoperative value of 128.54 to postoperative value 31.12 in group 1 (TUIP) showing a statistical significance with a p value of 0.00 (Ref.Table 8).

PFR improved from mean preoperative value of 114.44 to postoperative value 24.63 in group 2 (TURP) showing a statistical significance with a p value of 0.00 (Ref. Table 9).

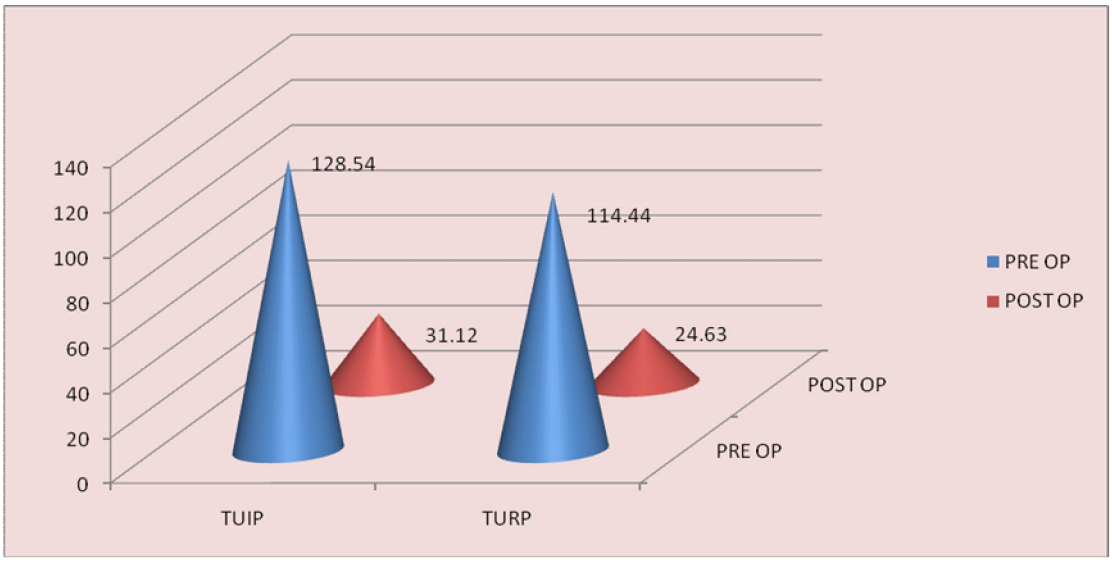


FIG 14 : PRE & POST OPERATIVE POST VOID RESIDUAL URINE

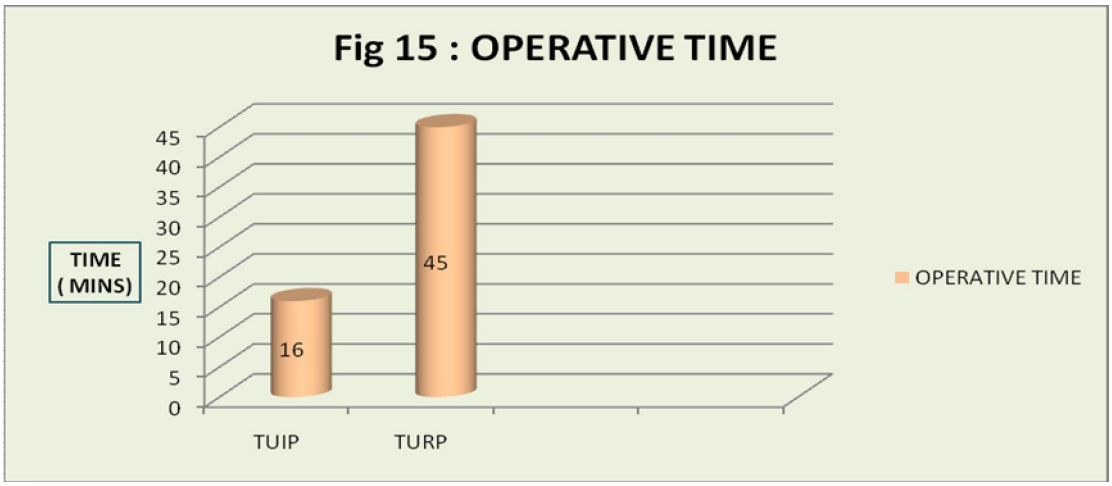
Pre operative PVR values of group1 and group2 were not statistically significant with p value of 0.734

Table 12 : Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	**Sig.**	**t**	**Df**
PRE OP-POST VOID RESIDUE-ml	Equal variances assumed	.567	.455	.734	51
	Equal variances not assumed			.732	49.289
POST OP-POST VOID RESIDUE-ml	Equal variances assumed	1.614	.210	1.118	51
	Equal variances not assumed			1.102	31.280

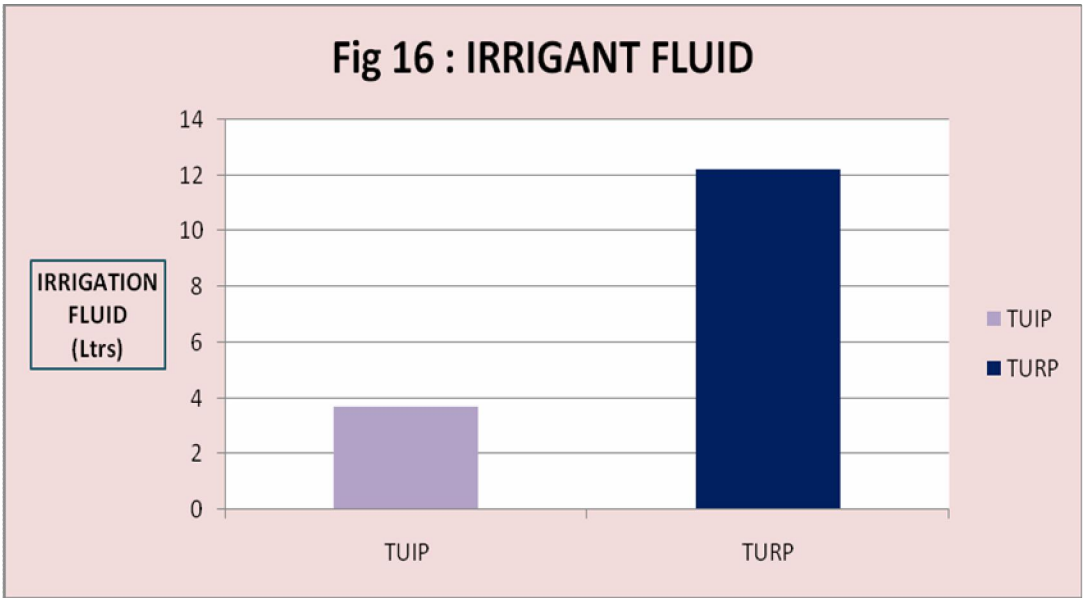
Operative time:

Operative time for procedure in group 1- 16 minutes and group 2- 45minutes were showing statistically significant difference



Irrigation fluid:

Irrigation fluid used for procedure in group 1- 3.67 litres and group 2- 12.22 litres were showing statistically significant difference



DISCUSSION

BPH is a common disease of old age which may lead to troublesome LUTS [1]. The enlarged gland has been proposed to contribute to the overall lower urinary tract symptoms (LUTS) complex via at least two routes: (a) direct bladder outlet obstruction (BOO) from enlarged tissue (static component) and (b) from increased smooth muscle tone and resistance within the enlarged gland (dynamic component). Voiding symptoms have often been attributed to the physical presence of BOO.

In management of BPH, due to problems of compliance and cost effectiveness, surgical options are preferred in our setup. For many years TURP has been the standard treatment for the patients with symptoms which are too bothersome. TURP is effective but carries a risk of significant complications.

Hence we conducted a study to compare a less morbid procedure, TUIP, with the gold standard TURP, by means of intraoperative variables (amount of irrigant fluid used, operative time) and postoperative variables (improvement in symptoms, quality of life, peak uroflowmetry, residual urine volume).

60 patients were included in our study who fulfilled our selection criteria. They were randomly selected into two groups (Group 1- TUIP, Group 2 – TURP). The two groups were analysed for statistical equality.

Mean of age – 67.54 years and 65.07 years, gland size – 28.58 and 29.44 grams, IPSS – 25.73 and 25.41, QOL – 4.23 and 4.15 Peak uroflowmetry – 6.23ml and 6.36ml, post void residual urine – 128 and 114 ml in TUIP and TURP respectively which were statistically not significant.

In our study mean and mode of age of patients were between 61 – 70 years which is the common age group for BPH [1-3.] The variables which were considered above can affect operative procedure and outcome [3,7].

In studies conducted for correlation between size of gland and BOO symptomatology did not show significant relation.[3,16,41,76] There is no appropriate definition for small size gland (20 g by Orandi, 30 grams by Yang et al, up to 50 grams in Nielsen et al, Aliaga et al). So we planned to select 35 grams as upper limit of gland size.

TUIP – is an accepted option in management of BPH as an alternate to TURP especially in small size glands[1]. Several RCTs have shown TUIP as an equally efficacious, less morbid and cost effective procedure as compared with TURP. It is aneasier technique to master than TURP[3]

We compared intraoperative variables (amount of irrigation fluid used and operative time), which had shown statistically significant advantage for TUIP (3.6 vs 12.2 litres) and (16 vs 45 minutes). This outcome correlated with all the reference trials. These two factors are

directly related with risk of TUR syndrome development which revealed less risk with TUIP group.

Immediate postoperative variables blood transfusion, catheter dwell time, retention rate were analysed. In TURP group, 2 patients required transfusion (patient number 8 and 20 in chart).

One patient developed excess intraoperative blood loss due to highly vascularised gland and other had preoperative borderline haemoglobin.

Traction was applied in TURP group, not in TUIP group. Post operative discomfort like suprapubic and rectal discomfort, urgency and urge incontinence related to traction were not found in TUIP group.

Jahnsonetal recommended delayed decatheterisation in TUIP due to risk of adhesion between lateral lobes. In our study, all patients in both groups were decatheterised on fourth postoperative day and watched for retention.

In TUIP arm, 4 patients were not able to void, all of them recatheterised. 3 of them voided successfully in trial without Catheter after two weeks (2 in first and other in second attempt). But one patient (no.52 in chart) failed in trial without Catheter and underwent TURP. During the reprocedure, cystoscopy revealed synechiae formation.

In TURP group, 3 patients did not void on catheter removal. All of them were able to void on trial without Catheter. The reason may be due to edema at prostatic fossa and bladder neck or detrusor hypotonia.

These results were reasonably matched with studies by Allagaetal (1/20), Nielsen et al (3/24), Saporta et al (3/26).[27,28,31,111]

We discharged all the patients on the next day of catheter removal except those (8) recatheterised or transfused. In both groups none of the patient developed toxic complication or TUR syndrome.

A few patients in both groups had symptoms of urgency (6 in group 1 and 14 in group 2) which was managed by anticholinergic therapy.

Though, we had not encountered Bladder neck stenosis, theoretical risk is more with TURP particularly in small size gland[110,111].

Postoperative followup was done on the 15th day and then 1 and 3 months after. At third month, postoperative variable (improvement in IPSS, QOL, PFR and PVR.) were evaluated.

All biopsy specimen from TURP group revealed benign etiology.

Attrition:

4 patients in group 1 and 3 patients in group 2 failed to attend followup clinics, hence datas from 26 in group1 and 27 in group 2 were analysed for outcome comparision.

IPSS:

At 3-months postoperative follow-up visits there were very significant improvement of symptoms in both the groups with no significant difference between the groups. Mean improvement in group 1- 17.6 and in group 2 - 18.7 which were comparable with no statistical significance. These indicate that both the procedures are equally effective in reducing symptom score. These confirm the experience of Jahnsonet al (1998)[27], Riehmann et al (1995)[29], Lourenco et al(2010)[108] found no significant difference in symptom score improvement between the groups.

Quality Of Life:

Mean improvement in group 1- 2.81 and group 2 – 3.07 showing no statistical significance with p value of 0.452 were comparable with review of randomised trials by Lourenco et al[111].

Peak Flow Rate:

Concerning uroflowmetry, preoperative mean Qmax were in6.238ml/sec and 6.367 ml/sec, Postoperative Qmax were 16.396

ml/sec and19.176 ml/sec in TUIP and TURP group respectively at follow-up postoperative visit. These improvements of flow rates are highly significant following TURP as well as TUIP($P<0.001$) and there is insignificant difference between the groups ($P>0.1$). These results agree with those of Christensen et al (1990)24, Riehmann et al (1995)29, postoperatively in TURP and TUIP group respectively. Dorflingeret al (1987)12 found the change from 10.1 ml/secand 9.2 ml/sec preoperatively to 15 ml/sec and 19ml/sec postoperatively in TURP and TUIP group respectively. In Larsen et al (1987) series these change were 7.4 ml/sec and 8.6 ml/sec to 18.5ml/sec and 20.6 ml/sec. Hellstrom et al - 14.4 vs 16.3 ml/sec, Soonawalla et al – 19.1 and 20.5 ml/sec).. However one study showed significant difference between the groups[27] (Jahnsen et al). They postulated that the removal of the gland resulted in creation of a good channel in TURP group. The mean of difference between preop and postop PFR (improvement) in group 1 was 10.16 and group 2 was 12.81 ml/sec. Though difference of 2ml/sec in improvement between two groups showed no statistical significance and correlated with reference studies [26,31]

Post Void Residual urine:

Mean preoperative PVR was128.54 ml (75-370) in TUIP and 114.44 ml (70-380) in TURP group. These were 31.12 ml (0-45)and 24.63 ml (0-45) postoperatively in the TUIP and TURP group

respectively and there were no significant difference between the groups both preoperatively and postoperatively. But there are highly significant differences pre- to postoperative intragroup values. The mean of difference between pre-op and post-op PVR (improvement) in group 1-97 and group 2 – 90 ml. These results are similar to the reference studies (Soonawallaetal)[31]. These changes of PVR agree with Jahnsonet al (1998)27, Riehmann et al (1995)[29], Lourenco et al[108](2010) and others.

In our study, outcome assessed by comparing difference (improvement) in variables which shows TUIP is equally efficacious to TURP in smll size (less than 35 grams) BPH. Intra operative variable shows significant reduction in operative time and irrigant usage resulting decreased risk for stricture rate, TUR syndrome and electrolyte disturbances. In TUIP, immediate postoperative discomfort due to traction application is not present. Transfusion need is not present with TUIP, whereas transfusion is needed with TURP .An objection to TUIP is that incidental prostatic cancer will not be diagnosed due to non availability of tissue for biopsy. This could be dealt with by a needle biopsy of the prostate. However, Reoperation risk is more with TUIP. This leads to our concern over long term outcome of TUIP surgery hence the need for long term follow-up. TUIP can be a better choice in selected group of patients like those not fit for prolonged anaesthsis due to age or comorbid conditions.

CONCLUSION

TUIP is an effective method of relieving urinary outflow obstruction caused by Benign Prostatic Hyperplasia when prostate size is 35g or less.

TUIP is a less invasive, more cost effective treatment thath as fewer associated side effects than TURP.

In selected group of patients, TUIP is an effective alternative to TURP.

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Sl.No	GROUP	NAME	AGE - YEAR	IP NO	INSTITUTION	gland size-g	PRE-OP-IPSS	POST-OP-IPSS	PRE-OP-QOL	POST-OP-QOL	PRE OP-PEAK FLOW RATE-ml	POST OP-PEAK FLOW RATE-ml	PRE OP-POST VOID RESIDUE-ml	POST OP-POST VOID RESIDUE-ml	IRRIGATION FLUID L	OPERATIVE TIME	D.O.S
1	1	Mr.Velu	63	1600	kmc	29	23	8	4	1	7.8	15.6	90	24	2.5	12	2/3/2011
2	1	Mr.Renganathan	70	2075	kmc	32	27	9	4	2	9	17.1	85	18	3.5	18	2/8/2011
3	1	Mr.Muthusamy	69	967552	grh	27	24	6	4	1	6.5	18.3	104	30	3.5	15	2/9/2011
4	1	Mr.Thiruvenkatam	74	2243	kmc	30	30	25	5	4	0	0	370	160	4.5	18	2/15/2011
5	1	Mr.Abdhul Samad	68	969440	grh	23	26	7	4	2	8.2	19	100	32	3	16	2/25/2011
6	1	Mr.Noorulah	65	969225	grh	27	21	5	4	1	9.6	17.8	75	15	2.5	18	3/9/2011
7	1	Mr.Arumugam	70	7893	kmc	29	23	7	4	2	7.6	17.3	90	22	3.5	19	4/21/2011
8	1	Mr.Elumalai	60	8587	kmc	24	28	7	4	1	8.4	19.1	110	34	3	14	4/30/2011
9	1	Mr.Arunachalam	72	9718	kmc	34	27	9	5	3	5.1	14.8	130	35	5	20	5/17/2011
10	1	mr.ramukutty	80	976003	grh	32	31	9	4	2	0	12.5	320	40	4	16	6/3/2011
9	1	Mr.Arunachalam	70	9718	kmc	34	27	7	4	1	4.3	16.3	120	28	3	16	5/17/2011
10	1	Mr.Ramukutty	80	976003	grh	32	31	9	5	2	0	12.5	320	45	4	20	6/3/2011
11	1	Mr.Ganeshan	65	976254	grh	29	24	6	4	1	7.6	18.2	80	20	4.5	20	6/10/2011
12	1	Mr.Chinnappan	65	13956	kmc	24	23	6	4	1	6.8	17.9	94	30	3.5	16	7/11/2011
13	1	Mr.durai	60	14712	kmc	27	26	7	4	1	8.8	20.4	105	25	4	18	7/16/2011
14	1	Mr.Thankaraj	79	973447	grh	31	29	7	4	1	0	15.6	284	32	4	19	7/22/2011
15	1	Mr.Sambasivam	64	15947	kmc	28	26	6	4	1	7.9	19	100	18	4	14	7/26/2011
16	1	Mr.Chelladurai	55	999759	grh	24	22	5	4	0	8.4	22.5	80	15	3	12	7/29/2011
17	1	Mr.Perumal	60	17818	kmc	26	27	8	4	1	6.3	16.8	105	27	4	16	8/11/2011
18	1	Mr.Mohamed sherif	81	981286	grh	32	29	9	5	2	5.4	13.2	120	40	3.5	18	8/26/2011
19	1	Mr.Govindarajulu	71	17916	kmc	29	24	7	4	1	7.2	17.6	135	25	3	12	8/20/2011
20	1	Mr.Shanmugavel	75	981105	grh	32	28	6	4	1	8.4	16.8	100	18	3.5	16	9/7/2011
21	1	Mr.Vivekanandhan	60	19513	kmc	27	23	5	4	0	7.6	21.4	95	0	4	15	9/8/2011
22	1	Mr.Ramanathan	69	982190	grh	31	27	11	5	3	0	14.3	120	30	4.5	19	9/16/2011
23	1	Mr.Kallappan	59	982611	grh	26	29	14	5	2	4.8	11.8	130	50	5	18	9/21/2011
24	1	Mr.Pandurangan	65	983753	grh	32	24	7	4	1	7.9	16.8	90	20	4	17	10/7/2011
25	1	Mr.Elumalai	67	22875	kmc	24	21	7	4	1	8.6	16.2	110	16	3	16	10/18/2011
26	1	Mr.Dhanapal	72	986023	grh	34	27	9	5	3	5.1	14.8	130	35	5	20	11/9/2011

Sl. No	GROUP	NAME	AGE - YEAR	IP NO	INSTITUTION	GLAND SIZE-g	IPSS		QOL		PEAK FLOW RATE-ml		POST VOID RESIDUE-ml		IRRIGATION FLUID-L	OPERATIVE TIME	D.O.S
							PRE-OP	POST-OP	PRE-OP	POST-OP	PRE-OP	POST-OP	PRE-OP	POST-OP			
1	2	Mr.Chandran	70	2249	kmc	29	23	6	4	1	9.4	21	80	15	11	40	2/15/2011
2	2	Mr.Alaudhin	57	3757	kmc	27	24	7	4	1	7.8	19.6	110	18	12	45	3/3/2011
3	2	Mr.Dharmar	64	968783	grh	34	26	7	4	1	9.1	18.4	90	22	12	50	3/4/2011
4	2	Mr.Manivel	71	970384	grh	29	25	8	4	2	7.8	17.2	95	25	14	50	2/9/2011
5	2	Mr.Immanuvel	73	971701	grh	32	29	8	5	1	0	15.7	130	40	12	45	4/1/2011
6	2	Mr.Thaksinamoorty	57	971650	grh	30	21	5	4	1	8.8	19.8	80	12	11	35	4/6/2011
7	2	Mr.Sampath	68	12765	kmc	31	23	6	4	1	6.2	18.4	120	30	12	40	6/14/2011
8	2	Mr.Appasamy	75	13596	kmc	28	28	7	4	2	5.8	18.2	90	45	12	50	7/5/2011
9	2	Mr.Thirumal	65	978538	grh	24	27	7	4	1	7.4	20.7	100	25	12	45	7/6/2011
10	2	Mr.Kannappan	60	13375	kmc	27	31	6	5	1	0	21.3	270	18	14	40	7/12/2011
11	2	Mr.Mari	58	979209	grh	32	22	6	4	1	6.4	18.9	110	28	12	45	7/22/2011
12	2	Mr.Kothandan	64	978957	grh	29	20	5	4	0	7.2	22.4	70	0	11	40	7/22/2011
13	2	Mr.Venkatasamy	60	978973	grh	32	28	9	4	2	7.6	17.2	110	40	16	60	7/27/2011
14	2	Mr.Elumalai	56	15797	kmc	24	18	7	4	1	8.3	19.6	95	20	12	40	7/28/2011
15	2	Mr.Kaliyaperumal	63	978221	grh	27	24	7	4	1	6.3	17.8	100	25	12	45	8/3/2011
16	2	Mr.Rajagopal	62	979739	grh	32	27	5	4	1	7.6	21.3	110	20	11	45	8/26/2011
17	2	Mr.Kasi	60	18262	kmc	29	31	6	5	1	0	17.9	380	45	14	50	8/27/2011
18	2	Mr.Subbiah	68	982493	grh	33	24	5	4	1	8.6	21.6	80	18	11	45	9/9/2011
19	2	Mr.Rayappan	71	19352	kmc	26	22	7	4	1	6.6	20.4	80	22	12	40	9/10/2011
20	2	Mr.Krishnan	65	19355	kmc	34	27	6	4	1	5.2	19.6	90	27	12	45	9/13/2011
21	2	Mr.Nagappan	67	982622	grh	28	21	5	4	1	7.9	23.7	75	20	13	50	9/21/2011
22	2	Mr.Govindasamy	63	20571	kmc	29	25	7	4	1	5.8	17.6	120	25	12	45	9/29/2011
23	2	Mr.Nateshan	54	983473	grh	32	28	7	4	1	8.1	18.7	95	20	12	40	10/7/2011
24	2	Mr.Thulasi	70	984433	grh	34	30	9	5	1	4.8	14.6	130	40	13	50	10/12/2011
25	2	Mr.Elumalai	70	989406	grh	26	23	7	4	1	7.3	18	90	18	12	50	10/19/2011
26	2	Mr.Kaliyamoorthi	66	22884	kmc	30	29	8	4	1	5.4	19.5	100	27	11	45	10/27/2011
27	2	Mr.Thanavel	80	21265	kmc	27	30	7	4	1	6.5	18.6	90	20	12	50	11/1/2011

no	GROUP	NAME	AGE - YEAR	AGE-YEAR-GROUP	IP NO	INSTITUTION	gland size-g	PRE-OP-IPSS	POST-OP-IPSS	IPSS-DIFFERENCE	PRE-OP-QOL	POST-OP-QOL	QOL-DIFFERENCE	PRE OP-PEAK FLOW RATE-ml
23	2	Mr.Nateshan	54	1	983473	grh	32	28	7	21	4	1	3	8.1
16	1	Mr.Chelladurai	55	1	999759	grh	24	22	5	17	4	0	4	8.4
14	2	Mr.Elumalai	56	1	15797	kmc	24	18	7	11	4	1	3	8.3
2	2	Mr.Alaudhin	57	1	3757	kmc	27	24	7	17	4	1	3	7.8
6	2	Mr.Thaksinamoorty	57	1	971650	grh	30	21	5	16	4	1	3	8.8
11	2	Mr.Mari	58	1	979209	grh	32	22	6	16	4	1	3	6.4
23	1	Mr.Kallappan	59	1	982611	grh	26	29	14	15	5	2	3	4.8
13	2	Mr.Venkatasamy	60	1	978973	grh	32	28	9	19	4	2	2	7.6
8	1	Mr.Elumalai	60	1	8587	kmc	24	28	7	21	4	1	3	8.4
13	1	Mr.Durai	60	1	14712	kmc	27	26	7	19	4	1	3	8.8
17	1	Mr.Perumal	60	1	17818	kmc	26	27	8	19	4	1	3	6.3
21	1	Mr.Vivekanandhan	60	1	19513	kmc	27	23	5	18	4	0	4	7.6
16	2	Mr.Rajagopal	62	2	979739	grh	32	27	5	22	4	1	3	7.6
15	2	Mr.Kaliyaperumal	63	2	978221	grh	27	24	7	17	4	1	3	6.3
22	2	Mr.Govindasamy	63	2	20571	kmc	29	25	7	18	4	1	3	5.8
1	1	Mr.Velu	63	2	1600	kmc	29	23	8	15	4	1	3	7.8
3	2	Mr.Dharmar	64	2	968783	grh	34	26	7	19	4	1	3	9.1
12	2	Mr.Kothandan	64	2	978957	grh	29	20	5	15	4	0	4	7.2
15	1	Mr.Sambasivam	64	2	15947	kmc	28	26	6	20	4	1	3	7.9
9	2	Mr.Thirumal	65	2	978538	grh	24	27	7	20	4	1	3	7.4
20	2	Mr.Krishnan	65	2	19355	kmc	34	27	6	21	4	1	3	5.2
6	1	Mr.Noorulah	65	2	969225	grh	27	21	5	16	4	1	3	9.6
11	1	Mr.Ganeshan	65	2	976254	grh	29	24	6	18	4	1	3	7.6
12	1	Mr.Chinnappan	65	2	13956	kmc	24	23	6	17	4	1	3	6.8
24	1	Mr.Pandurangan	65	2	983753	grh	32	24	7	17	4	1	3	7.9
26	2	Mr.Kaliyamoorthi	66	2	22884	kmc	30	29	8	21	4	1	3	5.4
21	2	Mr.Nagappan	67	2	982622	grh	28	21	5	16	4	1	3	7.9
25	1	Mr.Elumalai	67	2	22875	kmc	24	21	7	14	4	1	3	8.6
7	2	Mr.Sampath	68	2	12765	kmc	31	23	6	17	4	1	3	6.2
18	2	Mr.Subbiah	68	2	982493	grh	33	24	5	19	4	1	3	8.6
5	1	Mr.Abdhul Samad	68	2	969440	grh	23	26	7	19	4	2	2	8.2
3	1	Mr.Muthusamy	69	2	967552	grh	27	24	6	18	4	1	3	6.5
1	2	Mr.Chandran	70	2	2249	kmc	29	23	6	17	4	1	3	9.4
24	2	Mr.Thulasi	70	2	984433	grh	34	30	9	21	5	1	4	4.8
25	2	Mr.Elumalai	70	2	989406	grh	26	23	7	16	4	1	3	7.3
2	1	Mr.Renganathan	70	2	2075	kmc	32	27	9	18	4	2	2	9
7	1	Mr.Arumugam	70	2	7893	kmc	29	23	7	16	4	2	2	7.6
9	1	Mr.Arunachalam	70	2	9718	kmc	34	27	7	20	4	1	3	4.3
4	2	Mr.Manivel	71	3	970384	grh	29	25	8	17	4	2	2	7.8
19	2	Mr.Rayappan	71	3	19352	kmc	26	22	7	15	4	1	3	6.6
19	1	Mr.Govindarajulu	71	3	17916	kmc	29	24	7	17	4	1	3	7.2
26	1	Mr.Dhanapal	72	3	986023	grh	34	27	9	18	5	3	2	5.1
8	2	Mr.Appasamy	75	3	13596	kmc	28	28	7	21	4	2	2	5.8
20	1	Mr.Shanmugavel	75	3	981105	grh	32	28	6	22	4	1	3	8.4
27	2	Mr.Thanavel	80	3	21265	kmc	27	30	7	23	4	1	3	6.5
18	1	Mr.Mohamed sherif	81	3	981286	grh	32	29	9	20	5	2	3	5.4
10	2	Mr.Kannappan	60	1	13375	kmc	27	31	6	25	5	1	4	0
17	2	Mr.Kasi	60	1	18262	kmc	29	31	6	25	5	1	4	0
22	1	Mr.Ramanathan	69	2	982190	grh	31	27	11	16	5	3	2	0
5	2	Mr.Immanuvel	73	3	971701	grh	32	29	8	21	5	1	4	0
4	1	Mr.Thiruvenkatam	74	3	2243	kmc	30	30	25	5	5	4	1	0
14	1	Mr.Thankaraj	79	3	973447	grh	31	29	7	22	4	1	3	0
10	1	Mr.Ramukutty	80	3	976003	grh	32	31	9	22	5	2	3	0

POST OP-PEAK FLOW RATE-ml	PEAK FLOW RATE-ml-DIFFERENCE	PRE OP-POST VOID RESIDUE-ml	POST OP-POST VOID RESIDUE-ml	POST VOID RESIDUE-DIFFERENCE	IRRIGATION FLUID-L	OPERATIVE TIME	D.O.S	pre-op retention	post-op retention	HOSPITAL STAY
18.7	10.6	95	20	75	12	40	7/10/2011	0	0	5
22.5	14.1	80	15	65	3	12	23/07/11	0	0	6
19.6	11.3	95	20	75	12	40	28/07/11	0	0	6
19.6	11.8	110	18	92	12	45	3/3/2011	0	0	5
19.8	11	80	12	68	11	35	6/4/2011	0	0	5
18.9	12.5	110	28	82	12	45	22/07/11	0	0	6
11.8	7	130	50	80	5	18	21/09/11	0	0	8
17.2	9.6	110	40	70	16	60	27/7/11	0	0	10
19.1	10.7	110	34	76	3	14	30/04/11	0	0	5
20.4	11.6	105	25	80	4	18	16/07/11	0	0	5
16.8	10.5	105	27	78	4	16	11/8/2011	0	0	5
21.4	13.8	95	0	95	4	15	8/9/2011	0	0	5
21.3	13.7	110	20	90	11	45	26/8/11	0	0	5
17.8	11.5	100	25	75	12	45	3/8/2011	0	0	5
17.6	11.8	120	25	95	12	45	29/9/11	0	0	5
15.6	7.8	90	24	66	2.5	12	3/2/2011	0	0	5
18.4	9.3	90	22	68	12	50	4/3/2011	0	0	5
22.4	15.2	70	0	70	11	40	22/7/11	0	0	5
19	11.1	100	18	82	4	14	26/7/11	0	0	5
20.7	13.3	100	25	75	12	45	6/7/2011	0	0	5
19.6	14.4	90	27	63	12	45	13/9/11	0	0	5
17.8	8.2	75	15	60	2.5	18	9/3/2011	0	0	5
18.2	10.6	80	20	60	4.5	20	10/6/2011	0	0	5
17.9	11.1	94	30	64	3.5	16	11/7/2011	0	0	5
16.8	8.9	90	20	70	4	17	7/10/2011	0	0	5
19.5	14.1	100	27	73	11	45	27/10/11	0	0	6
23.7	15.8	75	20	55	13	50	21/9/11	0	0	8
16.2	7.6	110	16	94	3	16	18/10/11	0	0	6
18.4	12.2	120	30	90	12	40	14/6/11	0	0	6
21.6	13	80	18	62	11	45	9/9/2011	0	0	6
19	10.8	100	32	68	3	16	25/2/11	0	0	6
18.3	11.8	104	30	74	3.5	15	9/2/2011	0	0	6
21	11.6	80	15	65	11	40	15/2/11	0	0	6
14.6	9.8	130	40	90	13	50	12/10/2011	0	0	6
18	10.7	90	18	72	12	50	19/10/11	0	0	5
17.1	8.1	85	18	67	3.5	18	8/2/2011	0	0	9
17.3	9.7	90	22	68	3.5	19	21/4/11	0	0	5
16.3	12	120	28	92	3	16	17/5/11	0	0	5
17.2	9.4	95	25	70	14	50	5/2/2011	0	0	5
20.4	13.8	80	22	58	12	40	10/9/2011	0	0	5
17.6	10.4	135	25	110	3	12	20/8/11	0	0	5
14.8	9.7	130	35	95	5	20	9/11/2011	0	0	5
18.2	12.4	90	45	45	12	50	5/7/2011	0	0	5
16.8	8.4	100	18	82	3.5	16	7/9/2011	0	0	6
18.6	12.1	90	20	70	12	50	1/11/2011	0	0	6
13.2	7.8	120	40	80	3.5	18	26/8/11	0	0	5
21.3	21.3	270	18	252	14	40	7/12/2011	1	0	5
17.9	17.9	380	45	335	14	50	27/8/11	1	0	5
14.3	14.3	120	30	90	4.5	19	16/9/11	1	0	5
15.7	15.7	130	40	90	12	45	4/1/2011	1	0	5
0	0	370	160	210	4.5	18	15/2/11	1	1	8
15.6	15.6	284	32	252	4	19	22/7/11	1	0	5
12.5	12.5	320	45	275	4	20	3/6/2011	1	0	5

PROFORMA

NAME: **AGE:** **SEX:**

ADDRESS: **IP.NO:**

D.O.A: **D.O.S:** **D.O.D:**

PRESNTING COMPLAINTS:

IPSS SCORE:

GENERAL EXAMINATION: **P.R:**

B.P:

PER ABDOMEN:

CATHETER:

PER RECTAL:

INVESTIGATIONS:

HB%: **BLOOD: UREA-** **SUGAR-**

SERUM CREATININE- **SERUM PSA-**

ELECTROLYTES-

URINE C/S:

USG KUB:

PROSTATE SIZE:

UROFLOW:

CYSTOSCOPY:

OPERATIVE PROCEDURE: TUIP / TURP

Operative time: **Irrigation:**

POST OP.PERIOD:

CATHETER REMOVAL:

USG:

FOLLOW UP:

IPSS SCORE:

UROFLOW:

BIOPSY:

IMPRESSION:

ULTRA SONOGRAM PHILIPS HD 6.1

UROFLOWMETER – LABORIE – DELPHIS KT